

# THE IRON AGE

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## Foundry Construction for Light Castings

Building of Modern Design and Low Depreciation Secured at Moderate Cost—Inclined Runway to Elevated Charging Floor

A stove foundry, the design of which represents a large experience in the requirements of manufacturing light castings, was completed within the past year by the Federal Foundry Company, Indianapolis. The layout of the foundry proper features centrally located cupolas from which the carrying distance to any pouring floor does not exceed 100 ft., an inclined cableway from

wide, subsequent increases in capacity depending upon a lengthening of the building and the installation of additional cupolas in the same relative locations as at present. The supporting framework of the building is of light steel construction with but one central row of columns lengthwise of the building, the columns being spaced on 25-ft. centers and dividing the floor space into two parallel

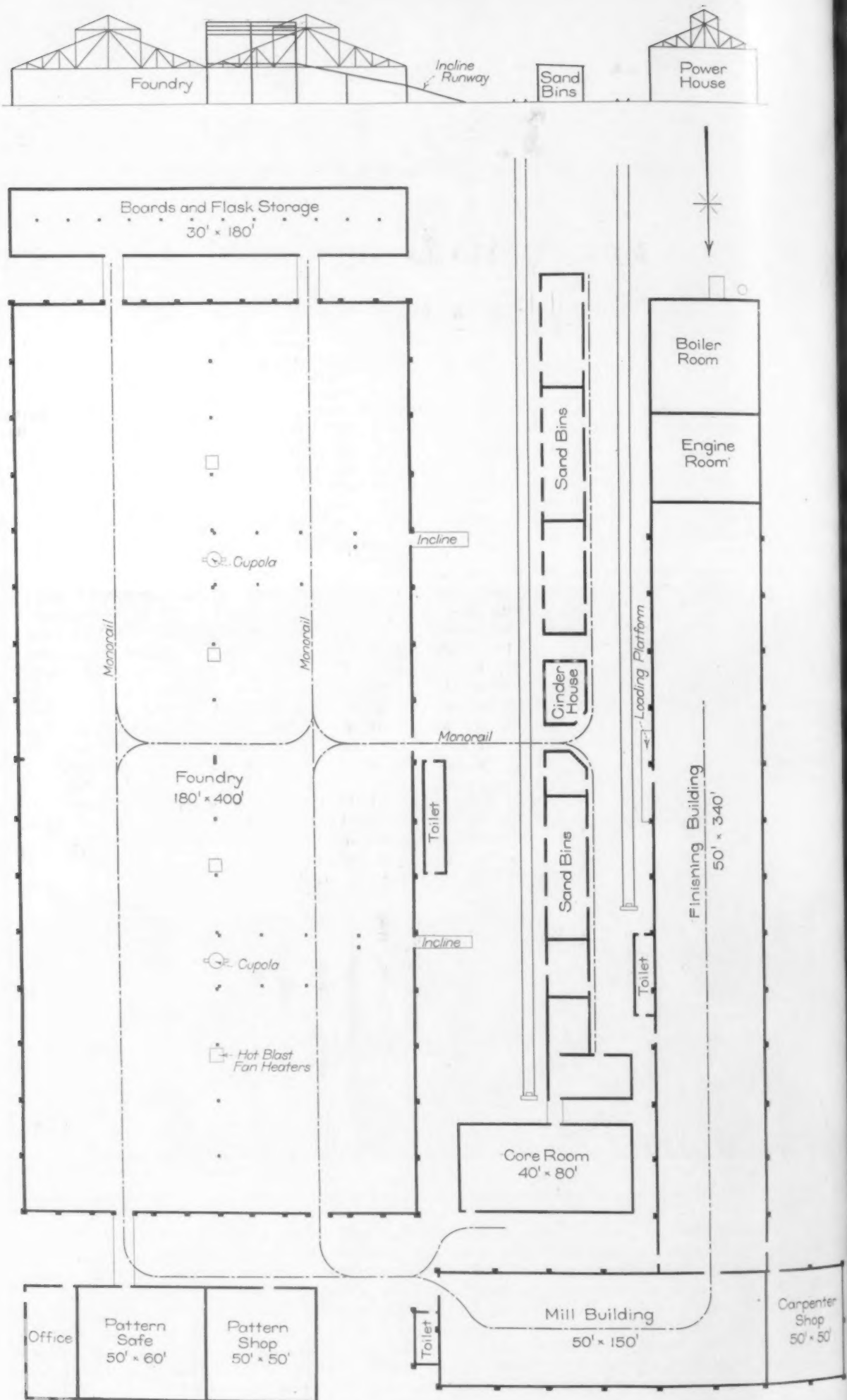


The Interior of the Foundry with the Inclined Conveyor to the Overhead Charging Floor, the Floor and the Cupola It Serves

the raw materials storage yard to the cupola charging floor, an overhead trolley which is a medium of transfer for the entire plant and wide holding floor bays with unobstructed spans of 90 ft.

The plant site has an area of 22 acres, having an especial fitness for foundry purposes because of the large proportion lying below the level on which the present buildings are erected in one corner of the property that is available for filling. The foundry building is 400 ft. long and 180 ft.

90-ft. bays. As can be noted from the accompanying cross-section of the building, a monitor-type roof has been adopted of only moderate height above the floor and equally moderate pitch. The building is almost entirely inclosed with glass from a low concrete wall to the eaves. The use of a trolley system, and that only above the main aisles of traffic, permits a much lighter overhead construction in the building framework than would be possible with cranes of any type. To take up the longitudinal thrusts induced by the trolley-system



General Floor Plan of the Federal Foundry Company's Plant Showing the Arrangement of the Various Departments



The Storage Yard with the Sand Bins on the Left and the Pig Iron and Coke Piles at the Right. Industrial cars transfer the materials to the scale platforms and the inclines leading to the charging floors

operation a special lattice bracing has been used. The structural design is that of W. J. Carter, engineer, Cleveland, Ohio, and represents the very low cost of approximately 80c. per sq. ft. of floor area. The McClintic-Marshall Company was the steel contractor.

The ground plan illustrates the manner in which the auxiliary buildings are arranged around the foundry proper. The sand bins are in two duplicate units, one for each cupola. On the one side of the bins the sand is received through doors from the incoming cars while on the opposite side it can be loaded as required into steel boxes which are then carried into the foundry via the trolley which is equipped with a 4000-lb. Pawling & Harnischfeger cage-controlled hoist. Between the sand storage bins and the foundry is an areaway in which the raw materials, pig iron and coke are stored. The standard railroad switch provides for bringing these materials into the plant. The matter of getting the raw materials into the cupolas is made somewhat unusual by reason of their location in the center of the foundry. An elevator is installed by the side of the cupola, operating between the foundry and the charging floors, but the

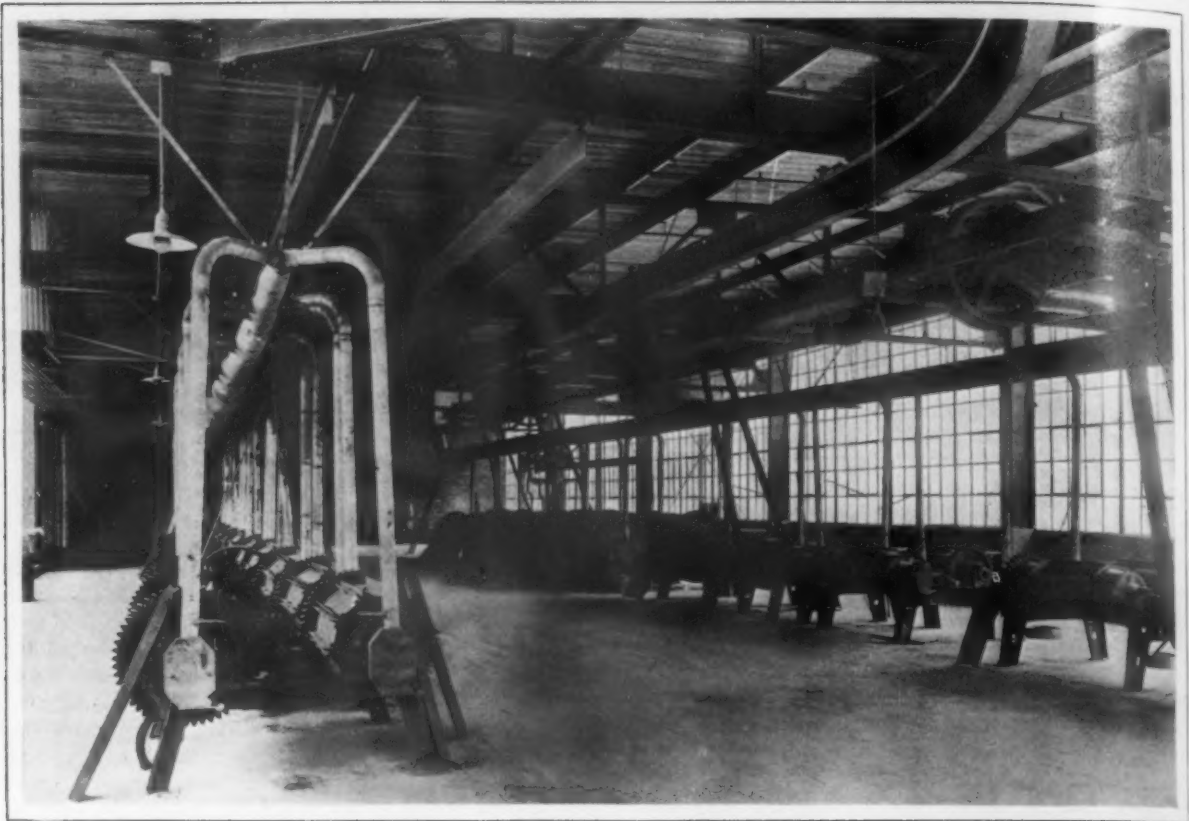
more common plan of trucking the iron and coke across the foundry floor to this elevator has been discarded as an undesirable intrusion upon the normal molding floor operations. Accordingly an inclined runway with a motor-driven cable haul is built on which the small charging cars that are loaded on the industrial track and weighed on the track scales shown in the illustration can be run directly from the yard up to the charging floor. The details of the construction by which the incline and charging floor are incorporated in the building structure is shown in the accompanying cross-section. The charging floor elevators were furnished by the Curtis Pneumatic Machinery Company, St. Louis, and have a capacity of 4400 lb. Artificial heating of the foundry building is provided for in the installation of four Baetz air heating apparatus, furnished by Skinner Brothers, St. Louis, these units being of the indirect type in which air, under fan pressure, is heated in contact with steam coils.

With a few minor exceptions where hand work on the bench and floor is necessary, the molding in the foundry is entirely by machine. The mechanical equipment still includes hand squeezers, but the



The Coterroom with the Oven in the Center Equipped with Overhanging Hood to Carry Off the Gases, the Temporary Core Storage Racks and the Benches Located on Three Sides of the Room Facing the Outside Light





The Milling Room Which Connects with the Shipping Room and Is Served by the Plant Monorail System

greater number of the machines are of the power squeezer type, built by the Osborn Mfg. Company and the Arcade Mfg. Company. The molding floors are laid out on both sides of the center aisles extending to the center line of the building and to the walls. In area they are approximately 10 x 41 ft. The molding machines are mounted on casters so as to be readily moved in conformity with the not unusual method of working up the sand from the front to the back of the floor laying down the molds behind the machine. This sand is laid down in long piles at right angles to the aisles on which the molding floors front and is mixed mechanically with machines furnished by the Sand Mixing Machine Company, Greenfield, Ohio. These mixers are electrically driven, and an electrical connection is brought down from overhead, at each floor, in a

conduit with a socket terminal, so that the mixer can be plugged in wherever desired. While water connections are made accessible there is no provision at each floor for wetting down the sand with a hose, for example. The amount of water mixed with each pile of sand is accurately measured for various classes of work and it is accordingly required that the water be handled in pails, a certain number to the pile of sand, varying from five to twenty-five, depending upon the weight of the casting.

The floor of the foundry is of milled clay laid from 10 to 12 in. thick and well tamped. For the designation of each molding floor the serial number system is employed, the four rows of floors being numbered from 1 to 100, 100 to 200, 200 to 300 and 300 to 400. The one number serves to link



The Pattern Storage Vault and the Way in Which the Patterns for Work to be Done Are Laid Out with the Order Card



together and locate accurately, the man, the work, the pattern and production. As soon as a pattern is ordered out of the storeroom it is immediately charged up on a blackboard to the floor number to which it is going. A pocket is provided on each molding floor for the insertion of a time and production card on which the record of the workman's time and the production on that floor is kept from day to day. Pouring of the molds is entirely from hand ladles, each molder pouring his own work. The cupolas were built by the Whiting Foundry Equipment Company and have 78-in. shells lined down to 60 in. They melt enough metal daily for about 50 tons of castings but the cupola capacity is in excess of the tonnage that can be got out on the floor.

For the handling of materials, dependence is placed almost entirely upon the overhead trolley.



One of the Centrally Located Cupolas with the Overhead Charging Platform and Inclined Runway and a Hot-Blast Fan Heater Having Large Discharge Pipes

Sand, flasks and boards are brought in, in trays or steel boxes, the castings after being shaken out from the molds are carried out to the mill room, scrap for remelt in the cupola is brought to the charging floor elevator, and the cupola drop is carried out to a Sly mill in the yard for the reclamation of useable metal. The coreroom which is housed in an isolated building is rendered conveniently accessible by reason of the trolley service.

A view of the coreroom is shown and with it an illustration of the type of cores made. The photograph presents a better description of the centrally located core ovens with overhanging hood to carry off gases, the racks for temporary storage of cores and the core benches on three sides facing outside light than is possible in the text. For the kind of work that is being done this arrangement has proved itself both convenient and effective. The interior of the mill room is also illustrated. Most of the mills were furnished by the Cleveland Chaplet Company and vary in size as required by the size of the castings. The interesting feature in the design of the drive for these mills was the careful attention to the speeds at which the mills turn over. The size of the casting, the diameter of the barrel and the number of revolutions at which it rotates are associated factors, the proper determination of which results in the casting turning over in the mill in a manner to make the cleaning action most effective. The application of the trolley service to this department is apparent. Coming from the foundry to the milling room, the trolley con-

tinues out through the opposite end to the grinding, inspecting and shipping rooms.

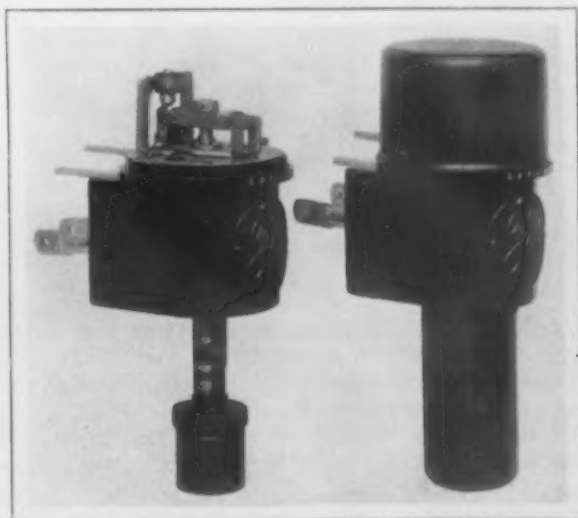
The pattern storage vault presents an interesting arrangement of shelves for the storage of patterns. Most of the patterns for this work are flat and readily stored on shelves with close vertical spacing. A flexible numbering system is used for the locating of the patterns which depends on the number of the shelf and the number of the pattern. Each section of shelf is numbered in sequence around the room but there is no attempt to return the same pattern to the same place each time it is used. A record is kept according to pattern number and when a pattern is returned the shelf number and date are entered against the pattern number which fixes the location of the pattern at any time. The open central floor space in the vault is used for laying out series of patterns in planning work for the foundry.

### New Protective Relay for Motors

For use in conjunction with a low-voltage release for automatic, overload and low-voltage protection of alternating-current motors up to 2500 volts and 3000 amp. the General Electric Company, Schenectady, N. Y., has developed a new type of circuit-opening oil dashpot relay. The relay is generally used with motors having self-contained compensator control, but sometimes for switchboard service when both low-voltage and time-delay overload protection are required. In such a case series relays replace the secondary relays, current transformers and oil switch tripping coils otherwise required.

The relay contacts, dashpot and calibrating tube are inclosed by dust-proof stamped steel covers. The relay is connected in series with the line with the low-voltage release across one phase in the customary way and the low-voltage coil in series with the relay contacts. When an overload greater than the current setting of the relay occurs the relay contacts open the circuit through the low-voltage release coil and the motor is cut out of circuit. If the voltage drops to a predetermined percentage of normal the motor is also disconnected from the power supply.

The current calibration is from normal rating to twice that figure, and the time adjustment is from



A Compensator Type Relay Designed for Use with Overload and Low-Voltage Protective Apparatus on Alternating-Current Motors

10 sec. to 5 min. on a 25 per cent overload. The current and time adjustments are accomplished outside of the dashpot with the aid of a screw driver, and are constant, as an adjusting nut is locked in place after each setting is made. The delay recommended for the normal starting current is about 15 sec., which affords ample protection to the motor against damage from overload or single-phase operation and also prevents the circuit from being opened while the motor is starting.

## PUPPE UNIVERSAL MILL

### German Development for Rolling Beams with Wide Parallel-Face Flanges

In the course of tests made in the last ten years to determine the power requirements for rolling blooms and different kinds of shapes Dr. Johan Puppe of the Royal Technical High School of Breslau, Germany, conceived the idea of a new type of beam mill. It is of the universal type and consists of two stands. One such mill, it is understood, has been in operation at the Peine Steel Works, near Hannover, Germany, since June, 1914.

The beam blank comes from the blooming mill in the shape of a thick walled H. It enters the

tended, than can be done with any other method and it allows for rolling beams or girders with almost any width of flanges. Special emphasis is placed on its making possible the rolling of flanges with absolutely parallel faces. The beams are designed with a slope of 10 per cent between web and flanges, to insure a smooth connection between these two parts. This sloped piece is short in regard to the total width of the flanges so that there is enough space left for the parallel part for attaching by means of rivets or bolts the cross-connection wanted. Finally, the first cost of a mill of this type, it is claimed, is small.

A general section of a Puppe beam is shown in Fig. 6, which represents a shape corresponding to a beam about 15 x 15 in. Three standard types

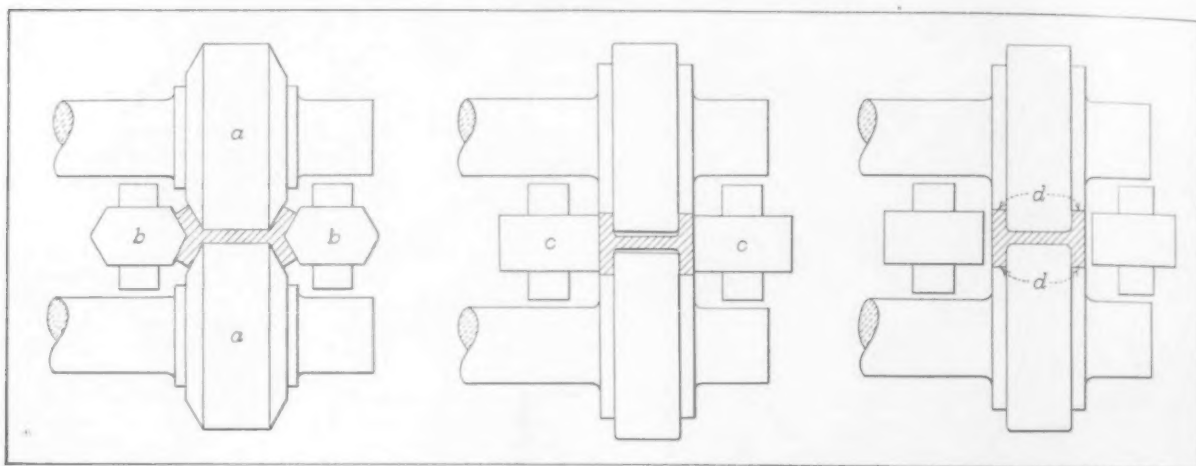


Fig. 1

Fig. 2

Fig. 3

The steel is received by the roughing mill, Fig. 1, in the shape of a thick walled H and is passed back and forth through the roughing and finishing

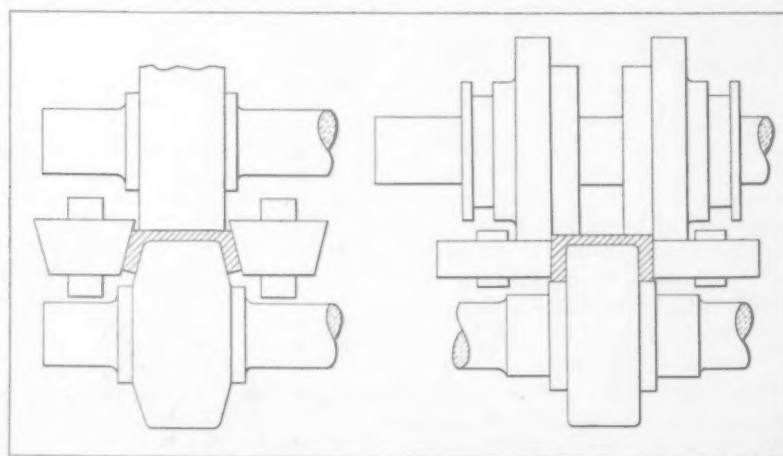


Fig. 4

Fig. 5

mills. Figs. 2 and 3 show the flange and edge rolling, respectively, in the finishing mill. Figs. 4 and 5 show the roll equipment for channels.

roughing mill, Fig. 1, where both web and flanges are worked, giving a bloom of a double Y-shape. From the rougher the bloom is going forward and backward through the finishing mill, Figs. 2 and 3. In the first pass of this mill, that is, during the forward movement of the beam, the flanges are straightened by means of the vertical rolls *c*, Fig. 2, while in the second pass, that is, during the backward movement of the beam through the same rolls, the edges are worked upon at *d*, Fig 3. The piece is then sent again through the rougher, where the flanges are bent back to the double Y-shape.

The beam or girder is rolled down to its final shape by continuously going back and forth through the roughing and finishing rolls until the final section is obtained.

Figs. 4 and 5 show the arrangement for a channel beam. Through this method the metal is worked and kneaded more thoroughly, it is con-

of shapes, containing 49 variations, can be rolled in the Puppe mill, it is stated, as it is arranged today. The smallest size is 160 x 160 mm. (about 6.4 x 6.4 in.), and the largest one 1000 x 380 mm. (about 40 x 15 in.).

Since the four rolls of the Puppe mill lie in the same vertical plane and move relatively to each other during the adjustment between the different passes, the housings and bearings had to be designed so that the ridges of rolls *b b*, say, in Fig. 1, are always exactly in line with the center of the web, since otherwise the flanges of the girder or beam would not be rolled with a uniform thickness above and below the web. That the pressure is distributed uniformly over the whole section of the beam is regarded as proved by the fact that the finished beam leaves the last pass straight so that a straightening out of the cooled beam is unnecessary.

Bearing on the working, so called, that the

steel gets in ordinary rolling, the following interesting discussion has been obtained from Fr. Denk, Steel City Engineering Company, House Building, Pittsburgh, who represents Dr. Puppe in this

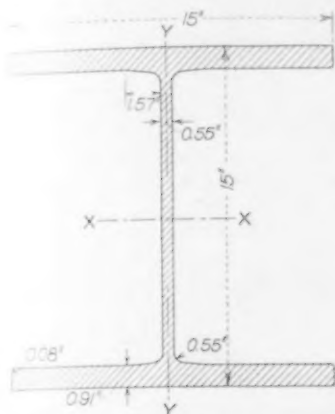


Fig. 6—Section of 15 x 15-in. Puppe Beam

country: Difference in the work of reduction of the metal during the rolling process is caused by the difference in speed of the various points of the ordinary roll groove. This difference in speed can be seen from Fig. 7, which represents an intermediate groove in a 35-in. three-high beam mill, rolling 18-in. I-beams. The diameter of the middle roll at point A is 26.25 in., while the diameter for the same point on the upper roll is 43.5 in. The circumferential speed is correspondingly 6.87 and 11.39 ft. per revolution, or, the speed of the upper roll for point A is 1.66 times as high as the speed of point A on the middle roll. Similarly, at section B B, the speed of the top roll is 1.29 times that of the middle roll. Such differences in the circumferential speed have a decided influence on the quality of the metal, and the design and layout of such grooves must be made with the utmost care, so that splitting or cracking of the beam, due to internal stresses, may be avoided.

#### A Hand Device for Testing Hardness

A simple device, adapted to determining hardness with a satisfactory degree of accuracy for many manufacturing purposes, is offered by M. F. Turpin in the *Revue de Metallurgie* for February, 1915. It employs a steel ball protruding from the end of a hollow mandrel backed by a cylindrical slug of known hardness on the Brinell scale. A plunger, protruding from the opposite end, surmounts this slug. When in use the ball is brought into contact with the piece to be tested and the free end of the plunger is struck with a hammer. A comparison is then made of the indentation with that of the standardized slug. The device is 30 mm. in diameter and 90 mm. long.

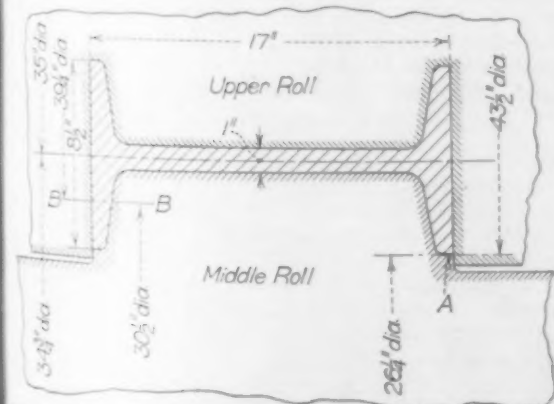
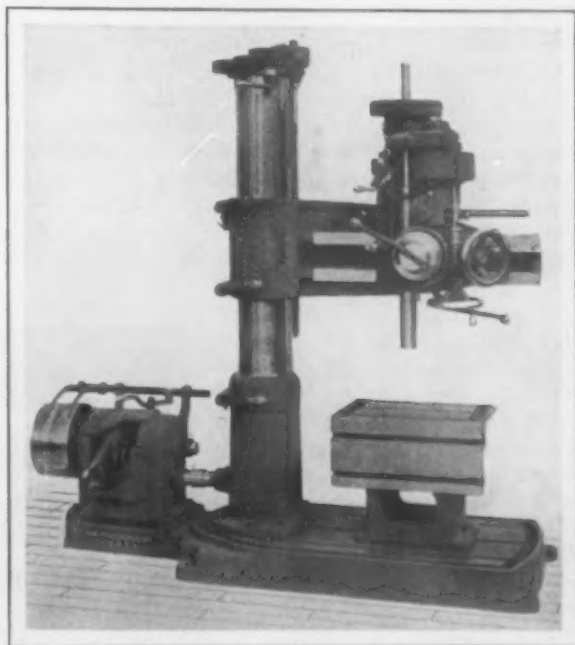


Fig. 7—Diagram to Illustrate Different Peripheral Velocities of Mating Rolls

#### Radial Drilling Machine with 2-Ft. Arm

The Fostick Machine Tool Company, Cincinnati, Ohio, has developed a new radial drilling and tapping machine, which will be known as its high-speed manufacturing radial drilling machine, and for the present will be built in two sizes, having 2 and 2½ ft. arms. The machines are designed to meet the demand for a high-speed durable tool, capable of handling a great variety of work, especially in shops where unskilled labor is employed.

The unusually wide range furnishes 48 rates of drilling, which are correct for 3/16-in. carbon to 2½-in. high-speed drills, in iron or steel, and for boring



A Radial Drilling Machine That Is Being Built with 2 and 2½-Ft. Arms

up to 5 in., all with but one speed at the pulley. A metal plate on the arm girdle, for high-speed drilling, corresponds to the indexes on the head and on the speed box.

The bushings are of special phosphor bronze, gears under severe duty are of steel forgings, hardened where necessary. Where the speed is high or the duty light, cast-iron or bronze gears of extra wide face are used. The spindle and principal driving shafts are of hammered steel, and the column, spindle and arm elevating thrusts are taken on ball bearings. The column and shafting are all finished by grinding.

In a recent test a 1-in. high-speed drill was driven through a very hard cast-iron slab 2 in. thick, in 7.8 sec., or at a rate of 15.4 in. per minute, the speed being 550 r.p.m. and the feed 0.028 in. per revolution. A 2½-in. drill was successfully driven through 1½-in. machinery steel at various rates, ranging from 137 r.p.m. with 0.007-in. feed, to 49 r.p.m. with a feed of 0.028 in. per revolution.

The 2-ft. machine will drill to the center of a 48-in. circle at the base, which has a working surface of 26 x 31 in. The 2½-ft. machine drills to the center of 60 in., and has a base working surface of 28 x 36 in. Other principal dimensions common to both machines are, base to spindle, 51 in.; spindle traverse, 12 in.; least diameter of spindle, 1 9/16 in.; spindle bore, Morse taper No. 4. The net weights of the machines are 2900 and 3200 lb. respectively.

Like the builder's heavy duty machines the interchangeable drive has been adopted. The cone-driven machine may be changed to speed-box drive, or vice versa, or a constant or adjustable speed motor may be added at any time, without the necessity of a special base, special speed box, special shafts, or gears in the machine. Tilting, swinging, or round tables of the builder's standard types can be supplied.



# Phosphorus Limit in Malleable Castings

Higher Percentages Than Customary Demonstrated as Beneficial in Some Cases—Important Dynamic Tests—Unsoundness from Shrinkage

The failure to include a phosphorus limit in the revised standard specifications for malleable castings recently adopted by the American Society for Testing Materials is made the nucleus of an investigation by Enrique Touceda, metallurgical engineer of Albany, N. Y., to prove that a slight increase is not harmful. The author presented the results of his work in a paper, "Some Remarks Regarding the Permissible Phosphorus Limit in Malleable Iron Castings," which he read in abstract at the convention of the American Foundrymen's Association at Atlantic City, N. J., Sept. 28, 1915. Mr. Touceda acknowledged his honest and bitter prejudice against phosphorus which, so far as steel was concerned, was still strong, if not stronger than ever. Still he believes now that "many mysterious failures of low carbon steel, attributed at the time wholly to a phosphorus content slightly above the Bessemer limit, would have been found to have been due to faulty structural conditions had we at that period been possessed of the knowledge since gained through the use of the microscope."

An abstract of Mr. Touceda's valuable paper follows:

Until several years ago the writer was strongly of the opinion that no good and dependable malleable iron could be made with a phosphorus content in excess of 0.20 per cent—strengthened by the examination of many poor samples that had come to hand from various sources. As the true cause of failure was, through study and investigation, thoroughly understood, the fear of phosphorus grew less. It is not my purpose to recommend that the manufacturer of malleable iron castings should take undue liberties with this element, especially as it leads to no saving in cost—since pig iron with a phosphorus content of 0.18 per cent is as plentiful and as cheap as that containing 0.30 per cent—but there are particular cases where to use a slightly higher percentage than is customary would result in a better product.

For the purpose of investigating this problem I decided to confine my experiments to the testing of specimens dynamically, for the reason that if the metal proved good under such conditions there could be no question as to what would be shown under tensile test. The test bar used was wedge-shaped, 6 in. long by 1 in. wide throughout, the dimensions of the base being 1 x ½-in. and of the top, 1 x 1/16-in.

## SPECIAL METHOD OF DYNAMIC TESTING

To test a specimen, its base is securely keyed into a slot in a vise free to rotate in the anvil of a drop hammer. The weight then is raised and the free end of the wedge is struck repeated blows; the effect of each blow is to cause the end of the wedge to curl up as

shown in Fig. 1, until finally failure takes place by fracture. The vise and anvil block have been so constructed that the wedge, when struck, receives the full force of the blow without upsetting. To accomplish

Table 1.—Chemical Analysis of Wedges Contributed by Manufacturer A.

	Set No. 1, Per Cent	Set No. 2, Per Cent	Set No. 3, Per Cent	Set No. 4, Per Cent
Silicon .....	0.800	0.810	0.800	0.800
Phosphorus .....	0.181	0.252	0.325	0.388
Sulphur .....	0.099	0.100	0.106	0.100
Manganese .....	0.284	0.290	0.291	0.251
Combined carbon .....	0.050	0.070	0.050	0.040
Graphitic carbon .....	2.070	1.910	1.940	2.260

this, the vise had to be so designed that the operator can turn the wedge in such a manner that the weight is always falling on the highest part of the curled end. The tripping pin that releases the hammer is in a fixed position to deliver an initial blow of 70 foot-

pounds, but a little reflection will prove that each succeeding blow is greater than this amount. This is due to the fact that owing to the curl of the wedge the weight has a slightly greater distance to fall before coming in contact with it than when the initial blow was struck, coupled with the fact that the maximum effect of the blow does not take place on the section struck, but on the extreme fibers of a section some distance from the former.

Through the courtesy of two producers of malleable iron castings I was furnished with sets of test bars, those from Manufacturer A having consisted of 24 wedges. The first six of this series were cast from a ladle which contained 30 pounds of air-furnace iron corresponding to the mixture that was being run in the foundry at that time. The next six were cast from

the same ladle of iron, but after an addition of a certain amount of 20 per cent ferrophosphide had been made; the next six were cast after a further addition of the alloy, and the last six after a still further addition. In this manner four sets of six wedges were obtained, the composition of which differed approximately only as to phosphorus content. At the time when the wedges were made, a ¾-in. square bar (not exactly square owing to draft), also was cast for

Table 2.—Number of 70 Ft.-Pound Blows Required to Break Test Wedges Shown in Fig. 2.

Set No. 2, No. of Blows	Set No. 3, No. of Blows	Set No. 4, No. of Blows
37	36	27
41	41	28
41	45	31
42	51	34
42	52	34
51	54	34

Average.. 43.33 46.50 31.33

transverse test, and the analyses in Table 1 were obtained from rillings taken from the bars and not from the wedges.

Unfortunately, the six wedges belonging to Set 1 inadvertently were not sent to me and I have since



Fig. 1.—Device for Testing Malleable Iron Specimens, Showing Wedge Partly Curled

been unable to secure them, but inasmuch as this set was poured from straight air furnace iron without the ferrophosphide addition, the omission will in no way affect the conclusions that can be drawn from these tests. That this statement can be made safely will be appreciated by referring to Fig. 2, which shows the curled wedges of Sets 2, 3 and 4. All of these, with two exceptions in Set 4, were subjected to 30 blows somewhat greater than 70 ft.-lb. each. One of the exceptions broke at 28 blows and the other at 27. After the wedges shown in Fig. 2 were photographed they were again subjected to this test until failure took place, and Table 2 contains a record of the total number of blows required to produce fracture.

Having described the method of testing, I believe it will be acknowledged that the metal of which Set 4 was composed, and which contains 0.388 per cent of phosphorus, is of superior quality and is trustworthy for most purposes. The metal of Set 3, which contained 0.325 per cent of phosphorus, is of still better quality and sufficiently high grade to be suitable for any purpose for which malleable iron castings may be required.

Phosphorus exists in iron as phosphide of iron. It unites with iron in definite proportion, which compound in turn is dissolved in solid solution in the excess iron. If the percentages of phosphorus in these four sets of wedges be calculated to phosphide of iron, we will obtain:

Set of Wedges	Phosphorus, Per Cent	Phosphide of Iron, Per Cent
No. 1...	0.181	1.086
No. 2...	0.252	1.512
No. 3...	0.325	1.950
No. 4...	0.388	2.328*

\*Approximate.

The  $\frac{7}{8}$ -in. square test bars, previously referred to, were cast at the same time and made of the same metal as the four sets of wedges, and to test these transversely, they were placed on the anvil of the same hammer, on supports 6 in. apart. The following is a record of the number of 70 ft.-lb. blows required to break them:

Bar No. 1.	Bar No. 2.	Bar No. 3.	Bar No. 4.
Blows	Blows	Blows	Blows
22	20	15	5

From these figures it would appear that as the section is increased, the evil effects of phosphorus become more manifest. However, bar No. 3 was subjected to fifteen 70 ft.-lb. blows before rupture took place, which for a metal containing 0.325 per cent of phosphorus, or about 1.95 per cent of phosphide of iron, is certainly no mean test. Bar No. 2, containing 0.252 per cent of phosphorus, or about 1.51 per cent of phosphide of iron, required 20 blows to produce failure, a test which I consider indicates superior metal.

#### INVESTIGATION OF GRAIN SIZE

In an effort to discover if the grain size had increased with the increase of phosphorus, a section was cut from each of these bars, which was polished and etched. Careful microscopical examination and a comparison of one sample with the other revealed no particular difference in grain size in any of the samples, though phosphorus is presumed to have this effect.

To avoid making conclusions from one set of tests only, samples were secured from Manufacturer B. The phosphorus determination of this series of wedges showed that the amount of ferrophosphide used was not sufficient to raise the phosphorus as high as I desired for the investigation, and I requested another

set which contained more of the alloy. (Detailed results are given in the original paper.)

None of these sets of wedges furnished by Manufacturer B contains as high a percentage of phosphorus as those furnished by Manufacturer A. The metal from which they were cast was of poor quality, but the practice of this shop has since been corrected. Unfortunately, the wedges were not cast as well as they might have been, which also may account for some of the variations in the results. When a test bar is subjected to such a severe test as the one used in this instance, any surface defect on the tension side is bound to influence the result to the disadvantage of the test bar.

It would appear then that when the amount of combined carbon is very low, the evil effects of phosphorus are slow to make themselves felt, and it requires a substantial increase in this element before a corresponding change in physical characteristics can be noticed.

#### UN SOUNDNESS FROM SHRINKAGE

Patterns occasionally are delivered to casting plants from which it is almost impossible to obtain satisfactory castings free from shrinkage in parts that should be very strong, in spite of the generous use of heavy risers and chills. A shrink results from failure to supply liquid metal to the mold so that as the shell of

the casting gradually builds up with solid metal, liquid metal always will be present to fill up solidly the last void in the casting. There are many circumstances that operate to make difficult, or entirely prevent, complete solidity in the average casting. A discussion of these is unnecessary to make clear the point I desire to make, namely, that of two furnace mixtures, one much more fluid at the same temperature than the

other; the former will produce castings from the same pattern with less shrinkage than the latter.

I have examined castings that have failed and have tested pieces cut from different portions of these castings to prove that these consisted of metal that was as tough and strong as malleable iron can be made, and that failure resulted because of local weaknesses due to unsoundness from shrinkage.

Unfortunately, according to present practice, the conditions that yield the toughest and strongest malleable are those that have a tendency to produce sluggish metal. Phosphorus being constant, carbon is that element in air-furnace iron that contributes more fluidity than any other, but experience has demonstrated that among other accompanying conditions, the lower the carbon approaches that point where the hard carbides in the white iron can still be broken up in the anneal, the stronger and tougher the finished product.

#### AN IMPORTANT QUESTION

If the facts as I have stated them are correct, then I would like to submit this question for your consideration:

In castings made from patterns poorly designed and which the manufacturer is not permitted to alter, or in complicated castings made from patterns that have been designed as well as skill can suggest, is it better practice to have certain parts of the castings strong and solid, and other parts weak and unsound, or is it better to effect a compromise and have the castings of fairly uniform strength and solid throughout?

There surely can be only one answer to this question. It is wrong to assume that the physical prop-

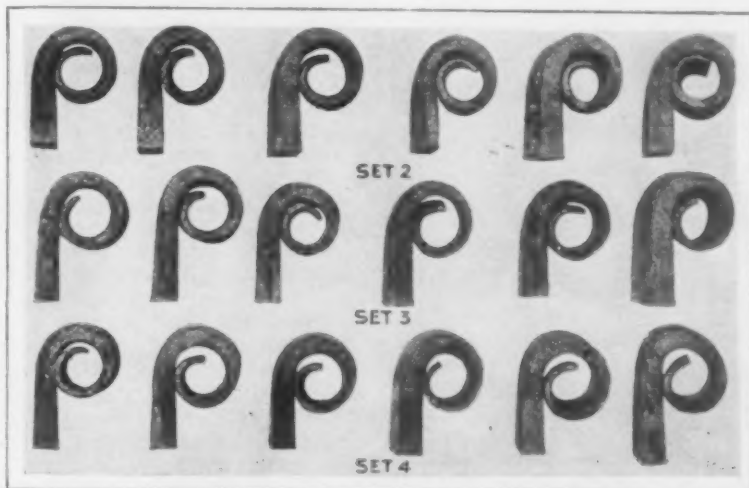


Fig. 2.—Tested Wedges Representing Sets 2, 3 and 4

erties of a metal, as shown by tests, on test bars easily cast sound, are representative of the quality of the metal in any part of a casting.

The manufacturers who are producing the best product are the ones who are constantly aiming to increase the strength of the weakest parts of their castings, the parts in which, due to certain laws, unsoundness is liable to occur, unless new laws are invoked to make these inoperative.

In conclusion, I will acknowledge that the experiments made are few in number, but the paper is not presented as one that has treated the subject in any other than an introductory manner. I hope that others will follow this particular line of investigation so that it can be determined definitely just how far it is safe to make use of phosphorus and to ascertain whether thickness of section is a factor entering into the problem.

## The Cost of Electric Furnace Steel\*

Data Based on Operating Experience with the Snyder Furnace—A Special Door to Prevent Heat Losses—The Argument for One Electrode

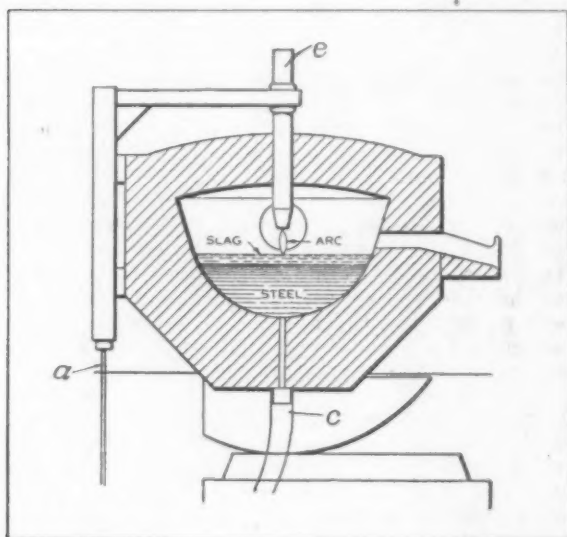
BY F. T. SNYDER

It is convincingly known to only comparatively few makers of steel that electric steel can be made at a cost substantially below the corresponding cost with fuel furnaces.

To render this information more widely available, this paper gives the operating costs for two sizes of furnaces in common use and of a type designed by the writer. In each case the costs represent records extending over continuous commercial use for periods of

account of such supervision. No overhead, due to cost and maintenance of buildings, is included. The building overhead cost varies widely from plant to plant, and is substantially independent of the sort of furnace used. The metal loss, due to spills and oxidation, is not included, as these depend largely on the care used by the melter. In each of the furnaces from which these costs come, the metal loss has been substantially below 1 per cent of the metallic contents of the charge. The cost for scrap used are real prices over long periods of time for special scrap material, and are due to the ability of these electric furnaces to handle low priced material.

In comparing these operating costs with other published records, it should be kept in mind that they do



The One-Electrode Type of Electric Steel Furnace

from 1½ to 2 years. As these costs are markedly lower than records of similar character of earlier types of electric steel furnaces, some of the reasons are given why such lower records should be expected with this latter furnace design.

### DESIGN OF THE FURNACE

The style of furnace from which these operating costs were obtained is shown by one of the illustrations. It consists of a circular shell lined with refractories. The current enters at *a* at the bottom of the crane and passes into the furnace by a single electrode *e* in the center of the furnace. The heat is generated in the arc by which the current jumps from the electrode to the slag covering the metal. The electric current leaves the furnace at *c* through a contact with the metal bath.

These operating costs as given do not include supervision, as the amount involved is so small, due to the simplicity and reliability of these particular furnaces, that no additional cost to the plants resulted on

\*From a paper presented at the twenty-eighth general meeting of the American Electrochemical Society in San Francisco, Sept. 16 to 18, 1915. The author is president of the Snyder Electric Furnace Company, Chicago.

Table of Costs of Operation When Melting Cold Scrap at 10-Ton Output

Output	Per Day	Per Ton
Heats in 11 hr. ....	4	
Tons of metal in 11 hr. ....	10	
Labor:		
Melter .....	\$4.00	
Helpers .....	2.50	
	\$6.50	\$0.65
Electricity (per kilowatt hour, 0.7c.):		
Furnace .....	\$34.70	
Substation .....	4.00	
	38.70	3.87
Supplies:		
Refractories .....	\$3.00	
Electrodes .....	6.00	
	9.00	.90
Maintenance:		
	2.40	.24
Direct cost .....	\$56.60	\$5.66
Burden:		
Interest, depreciation and taxes...	18.00	1.80
Conversion cost .....	\$74.60	\$7.46
Charge:		
Scrap .....	\$110.00	
Alloys .....	6.00	
	116.00	11.60
Total cost melted metal.....	\$190.60	\$19.06

Table of Costs of Operation When Melting Cold Scrap at 6-Ton Output

Output:	Per Day	Per Ton
Heats in 12 hours.....	4	
Tons of metal in 11 hours.....	6	
Labor:		
Melter .....	\$3.00	
Helpers .....	1.40	
	\$4.40	\$0.74
Electricity (per kilowatt hour, 1.4c.):		
Furnace .....	\$45.02	
Substation .....	1.84	
	46.86	7.81
Supplies:		
Refractories .....	\$1.70	
Electrodes .....	3.00	
	4.70	0.78
Maintenance:		
	.84	0.14
Direct cost .....	\$56.80	\$9.47
Burden:		
Interest, depreciation and taxes...	11.30	1.88
Conversion cost .....	\$68.10	\$11.35
Charge:		
Scrap .....	\$58.00	
Alloys .....	2.04	
	60.04	10.01
Total cost melted metal.....	\$128.14	\$21.36



not represent single heats or runs made under test conditions, or under exceptional circumstances. They are the average of regular commercial operation during long continued industrial service. They include the stand-by losses between heats, the breakages and waste of supplies, the lost time on Sundays and holidays, the overtime work on maintenance.

While these costs are taken directly from long continued industrial operations they are so low compared with similar records for furnaces of earlier design, that they naturally do not carry immediate conviction to operators who have had direct access to similar records of such earlier furnaces. It is desirable to show in some detail why such low operating costs should be expected with this type of furnace.

#### DETAILED DISCUSSION OF THE COSTS

Considering the cost items in the reverse order from that in which they appear on the cost statement, the item of burden, which includes interest, depreciation and taxes, is low due to the rapid melting ability of these furnaces. Each of these furnaces has regularly made four heats in an 11-hr. shift.

The item of supplies is made up of electrodes and refractories. Each of these furnaces runs regularly on less than 4 lb. of electrode per ton of steel poured, as compared with an average of 30 lb. for furnaces of earlier design. This large difference is due to the joint operation of several causes. The most important of these is the use of a single electrode in place of three electrodes. Electrode consumption is largely a matter of surface burning. Three electrodes of the same size would naturally burn three times as much as a single electrode. Actually, the ratio is much higher than three to one for several reasons. (Detailed reasons given in original paper.)

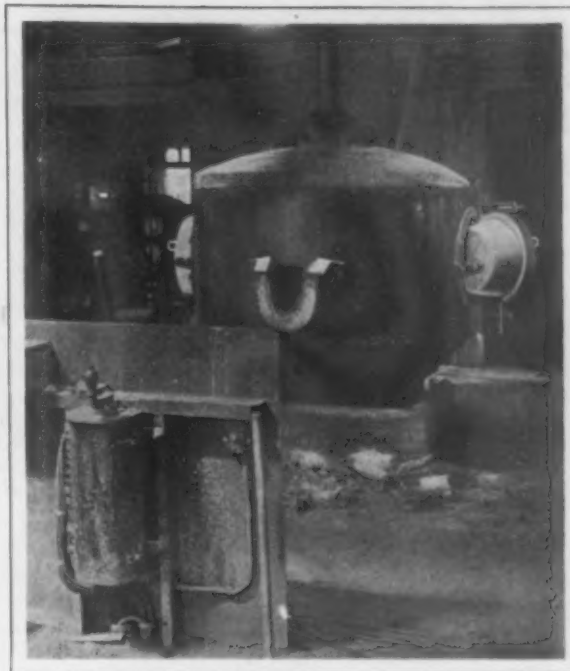
Most of the refractory wear in an electric furnace is on the roof. The sides are banked up with relatively cheap material that keeps the walls from wearing. This roof wear is largely around the electrodes and is partly due to the hot gases that escape between the electrode and the roof. With three electrodes this wear of the roof near the electrode would be expected to be three times as large with a 3-electrode furnace as with a 1-electrode furnace. It is further increased due to the fact that 3-phase current is used with three electrodes. To reduce the leakage current between electrodes, the electrodes of a 3-electrode furnace are moved as far apart as practical. The further they are moved apart the nearer the arcs come to the walls and the higher the cost of wall refractories per ton of product. With these single-electrode furnaces, the arc is at the center at the maximum distance from the walls, with consequent low wall wear.

With equal safety to operators, the arc voltage of a single-electrode furnace is substantially double that of the voltage of each arc of a 3-electrode furnace. The temperature of an arc in a steel furnace is determined by the amount of energy it has to radiate per square inch, substantially according to Steffens' law. With single-electrode furnaces the energy consumed is low, and the arc surface is large. Therefore the arc temperature is low.

The refractories are at a temperature between the arc temperature and the temperature of the bath, as in an arc furnace about 50 per cent of the energy reaches the bath by reflection from the lining of the furnace. Therefore, the lower arc temperature of these single-electrode furnaces means a lower refractory temperature.

#### LOSS OF HEAT THROUGH DOORS

The electric heat used in an electric steel melting furnace is made up of two parts. One part goes into the metal and goes with the metal into the ladle. This part is a fixed amount per ton for a definite pouring temperature. It is the same for all steel melting furnaces, both fuel and electric. The other part represents the heat lost during the melting operation. It all appears in the heated air around the furnace or in the cooling water from the various jackets used. This heat is lost through the doors, the roof, the shell and the electrodes.



The Snyder Electric Steel Furnace Showing the Special Plug Type of Door

These furnaces are fitted with a door in the form of a plug, as shown by one illustration, so that in place of the usual 4½-in. (11.5 cm.) of door brick, they present the resistance of 14 in. (35 cm.) of thickness to the flow of heat. Thorough tests of the sliding type of door usually used with earlier furnaces show a door loss exceeding 100 kw.-hr. per ton of steel. Much of this is saved by this plug type of door. We have no experimental results on the actual heat losses with the plug type of door, but our calculations, based on its outside temperature, show probable heat losses of 3.3 k.w. per furnace door.

These furnaces have roofs substantially 50 per cent thicker than those of earlier design. Special attention has been given to the design of the shell linings. They are designed for and operate with external surface temperatures at about 60 deg. C. It is practical to hold the hand against the outer surface of the furnaces. In actual practice the radiation losses are so low that no extra means are used to keep them hot between heats. The furnaces are luted up after the last heat of a shift and when opened for the next day's operation have lost so little heat as to be ready for immediate operation.

#### HEAT LOSS THROUGH ELECTRODES

The principal unavoidable heat loss in an electric furnace is through the electrodes. Just as a copper wire conducts electricity better than air, so a carbon electrode conducts heat much better than would the air in an empty electrode hole. With the 3-electrode furnaces and with the three electrodes of the same size as the single electrode, the heat loss would obviously be three times as great as in the single-electrode furnace. Actually the ratio is much higher, due to the economic necessity of using amorphous carbon electrodes in 3-electrode furnaces. As used in the best actual practice, the cross-sectional area to the three carbon electrodes of a 3-electrode furnace is about 15 times the cross-section of the one graphite electrode of the single-electrode furnace. Carbon at these temperatures has about half the heat conductivity of graphite, so that the heat lost through the three electrodes is about 7½ times the heat lost through the one electrode. However, with the single-electrode furnace a contact is also required to connect the charge with the circuit. This contact loses some heat, hence the net result is that the heat loss due to the introduction of the current in a well-designed 3-electrode furnace is about 5 times the heat loss in a one-electrode furnace.

The low labor cost with these furnaces is due primarily to the simplicity of the mechanical and electrical construction. The smaller of the furnaces is handled entirely by a single man, except when charging, when three helpers are used to shorten the charging time. Each of these furnaces has been left for an hour at a time without attendance, at work at full power. This extra time the single melter uses in making ready the next roof and in shearing up scrap for easy shoveling.

The other material factor in the low labor cost is their rapid melting ability and the consequent relatively large tonnage output per man, as shown in the labor items in the tables given, expressed per ton of steel. This output capacity is in turn due to the fact that the electric input very largely goes to melting steel. This effect is cumulative, as the shorter time of heats reduces the radiation time chargeable to each ton, and so releases further energy for melting steel. This in turn reduces the labor cost per ton of output for a definite size of furnace.

#### THERMAL EFFICIENCY

In closing, it may be stated that these furnaces show a thermal efficiency not far from double that usual with furnaces of older design. The most reliable figures we can get for regular operation of furnaces of older design operating on a single shift show about 1000 k.w.h. per ton of steel, of which only 33 per cent goes into the ladle with the fluid steel and slag; the single-electrode furnaces under equivalent conditions use only about 560 k.w.h. per ton of steel, the corresponding efficiency being 63 per cent. This is important commercially.

The slow progress of electric steel making in the first 10 years of its commercial existence was due to its high costs. It could not compete with most types of fuel furnaces. Its plea for existence had to be based on quality of product. The advance in this country, where quality was relatively unimportant, was slow. These furnaces of newer design give costs that are lower than most types of fuel furnaces. The higher quality of electric steel is secured for nothing. The real competition in the past has not been between different types of electric furnaces, but between all types of electric furnaces and fuel furnaces. Now that properly designed electric furnaces can compete in cost with fuel melting on steel, their introduction in this country should be accelerated.

#### Corrugated Steel Cleats for Barrels

The Co-Z corrugated steel cleat for kegs and barrels is being placed on the market by Hubbard & Co., Pittsburgh, Pa. It has a corrugation or rib extending through the center of the cleat from one end to the other. This is to add strength to the cleat and enable it to resist shocks.



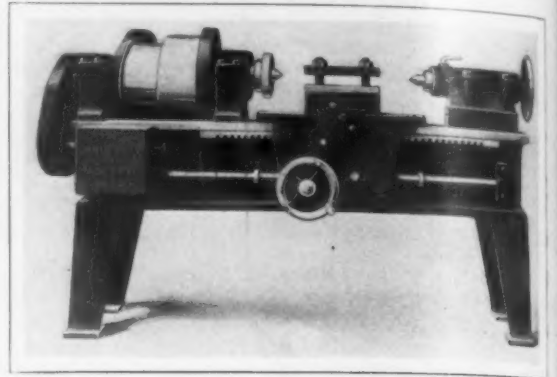
A Corrugated Steel Cleat Having a Central Raised Reinforcing Rib for the Heads of Barrels and Kegs

The cleat is made to suit standard sizes of kegs or barrels, but variations in the width of the head are taken care of in the shape of the ends of the cleats, which adapt themselves to the heads which are not the exact standard size. The cleat can be used on barrels or kegs of any size with either steel or wooden hoops. It is pointed out that the cleats are readily applied and do not interfere with stenciling or marking the barrel for shipment, as this can be done before the cleats are applied.

The multiplicity of cylinders in automobiles is to be discussed at a meeting at Buffalo, N. Y., Nov. 4, of the American Society of Mechanical Engineers by J. G. Vincent, vice-president Packard Motor Car Company.

#### Plain Lathe for Turning Projectiles

Another contribution to the number of projectile lathes that have been placed on the market by firms that ordinarily do not build this class of machine tools has been made by the Earle Gear & Machine Company,



A Heavy-Duty Engine Lathe Having a Swing of 18 In. for Turning Projectiles

Philadelphia, Pa. It consists of a machine that is made for three different swings of 18, 20 and 24 in., the length of bed being 7 ft. for the first size, which is the one illustrated, and 1 ft. longer for the other two.

The lathe when equipped for belt drive has eight different spindle speeds including two secured through the use of back gears. In conjunction with the three rates of feed,  $\frac{1}{8}$ ,  $\frac{1}{16}$  and  $\frac{1}{32}$  in. per revolution of the spindle, twenty-four cutting speeds, the highest being 68 ft. per minute, are available. If this range is not sufficient, the substitution of an adjustable-speed motor for the two-step cone and the countershaft provides additional speeds.

To enable the machine to be used for performing the nosing operations on shrapnel and other shells a spindle with a 1-in. hole extending entirely through it is provided for the headstock, together with a forming attachment milled to the contour of the nose. At the faceplate end a recess is bored into the spindle which is of sufficient diameter and depth to take any shell within the capacity of the lathe and give a chuck grip of at least 4-in. bearing surface.

#### Apparatus for Determining the Critical Point in Iron and Steel

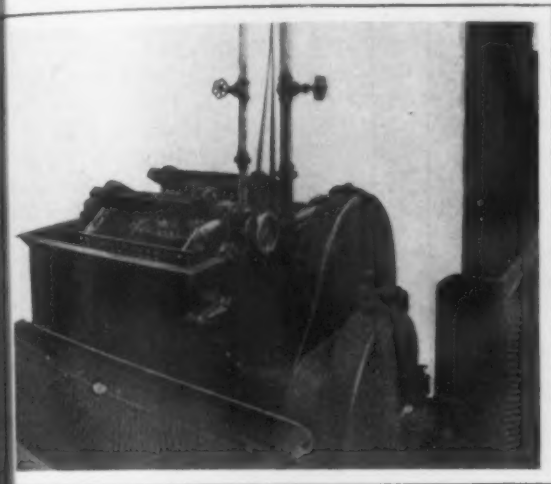
A complete apparatus for the accurate determination of critical points in iron, steel and non-ferrous alloys has been put on the market recently by the Scientific Materials Company, of Pittsburgh. The Scimatco method, as it is called, is an adaptation of a sensitive and accurate method for detecting and measuring small thermal changes in solid bodies. It is based upon automatic comparison of the temperature, during heating and cooling, of the metal test specimen with that of another neutral body which has no transformation points of its own—at least not within the temperature ranges studied. Both are heated and cooled together in one vertical heating chamber under absolutely uniform conditions. The critical points are read directly on a specially designed duplex instrument, and a special chronograph is provided, from the records of which all kinds of curves may be plotted.

The Snyder Electric Furnace Company, Chicago, states that the electric furnace which it recently installed for S. Fair & Sons, Inc., Saginaw, Mich., was under guarantee that the kilowatt-hour consumption per ton would not exceed 880. The first two heats averaged 620 k.w.h., and the third heat, from a hot furnace, 590 k.w.h. Basing current on 1c. per k.w.h., this means that the furnace from the start operated at a cost of \$3 per ton less than that guaranteed for it.

The Warren Tool & Forge Company, Warren, Ohio, is working on an order from the British Government for 80,000 picks to be delivered Nov. 20.

### Automatic Spring Forming Machine

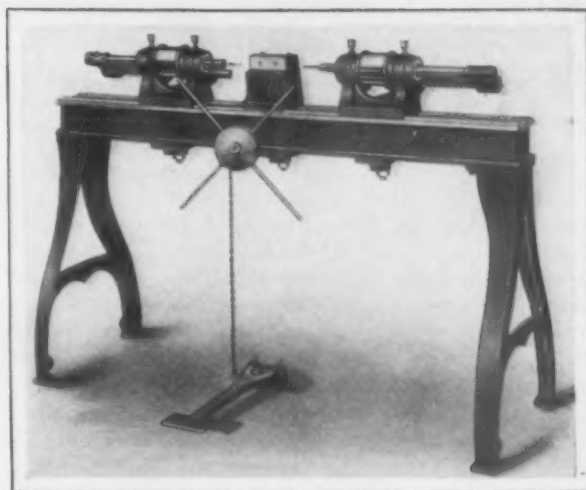
The accompanying illustration is a view of an automatic spring forming and tempering machine devised by and installed in the plant of the Ford Motor Company. With respect to the forming clamps in which the straight piece of spring steel is placed, this machine is similar in principle and operation to the one described in THE IRON AGE, May 27, 1915, and installed in the plant of the Harvey Spring Company, Racine, Wis. This machine, however, instead of reciprocating consists of six arms rotating on a central axis, the rotation of the arms carrying the spring through the oil bath. The machine is also equipped with an automatic ejector which catches the spring when it is released from the forming clamp after emerging from the oil bath



Spring Forming and Tempering Machine Requiring no Attention beyond Placing the Steel on the Feeding Shelf of the Furnace and the Removal of the Finished Product from the Oil Bath

and throws it out upon the screen shown in the foreground to drip. The operation of the entire machine is controlled by a single clutch, the subsequent stages following automatically.

The spring steel is heated in two parallel continuous-feed furnaces. Inserted in the bed of the furnace are two courses of brick running the length of the furnace and mounted on a cam-actuated oscillating bar, the travel of which alternately lifts the pieces of steel and carries them forward as the course of brick rises above the level of the furnace bed, and lays them down again as it sinks below the hearth level. From the placing of the steel upon the feeding table of the furnace until the finished spring is completed, the entire operation of heating, forming and tempering is automatic.



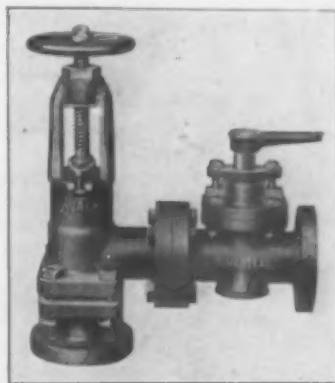
A Horizontal Double-Head Drilling Machine Capable of Handling Work up to 30 In. in Length and 10 In. in Diameter

in diameter and 3-in. face and are mounted, as may be noted, between the bearings of each spindle. The machine is especially suitable for light drilling where holes on opposite sides or ends of a piece can be finished in one operation, and it can be used for end milling or counter boring advantageously. Using self-opening dies, this machine is a convenient tool for threading both ends of bar stock.

### A Combination Boiler Blow-Off Valve

A regrinding and renewable blow-off valve of the angle type has been designed by the Homestead Valve Mfg. Company, Homestead, Pa. It is intended for use with one of the maker's plug cock quarter-turn valves to give a double blow-off arrangement. By using the combination shown of the two valves a double protection against leakage is secured and it is possible to close the valve nearest the boiler, thus enabling the blow-off valve to be repaired without closing down the boiler.

The blow-off valve has a semi-steel body with a Monel metal valve seat and disk and bronze trimmings. The valve is designed to give a large clearance for repacking, and when the valve is open the disk is entirely above the valve port. The disk is reversible and can be reground when necessary. Loosening the four bolts holding the valve body together releases the seat and enables the disk to be removed. The valves are made in four sizes ranging from 1½ to 3 in. in diameter and are supplied for either screwed or flanged fittings.



A Combination of Angle Blow-Off and Quarter-Turn Valves to Protect a Boiler

### Horizontal Two-Head Drilling Machine

The Wilcor Mfg. Company, 4824 Lake Street, Chicago, Ill., successor to Fritz A. Schulz, is placing on the market a double-head drilling machine. The mounting of the headstocks on the bed permits of a swing of 10 in., while the headstocks are horizontally adjustable on gibs to a maximum gap of 10 in. between centers. The spindles have a travel of 3½ in. and are bored for ¾-in. Morse taper. The bed occupies a floor space of 24 x 60 in.

The travel of the spindle may be set for any distance within the maximum by a ratchet attachment, and when the machine is set for a certain piece of work the hand lever control may be easily removed and the machine controlled from the foot pedal. The operator then has both hands free to assemble and feed. The driving pulleys are 4 in.

At the October meeting of the Chicago Local Council of the National Safety Council, R. W. Campbell, president of the national organization, gave an address, illustrated with stereopticon views, sketching the progress of the safety movement to date. The nominating committee presented its report naming the proposed officers for the ensuing year. A. L. Clark, superintendent American Brake Shoe & Foundry Company, is nominated for president and H. L. Gannett, Commonwealth Edison Company, for secretary.



## RECORDING EXPORT SHIPMENTS

## How the Detail Instructions of Different Foreign Buyers Are Preserved

BY H. A. RUSSELL

Export customers as a rule like to have their orders packed the same way each time. It is impossible for the shipping department or for the order entry clerk to remember these different instructions, especially as the receipt of export orders from the same customer is not a daily occurrence. Some place their orders several times a year, others will order certain implements or machines around a certain date each year. Export orders are often for machines or implements that vary considerably from the domestic requirements. Furthermore, should an error be made in a domestic shipment, possibly some part omitted, the error while inexcusable, can usually be rectified, but a shortage in an export shipment is another matter and it may take months to get the needed part or parts to the customer.

Some of our export shipments after reaching the wharf or railroad station at the other end are packed on mule back and transported many miles into the interior of the country. So in order to have a check on what was furnished to each and every export customer, we planned the form illustrated. The information recorded becomes of great value when the regular shipper is absent; and even

Form No. 1 Packing List of Individual and Combined parts for Shipments			
Article #8 M. B. Truck, Hoode & Sons		Date 5-27-15	
QUAN.	DESCRIPTION	QUAN.	DESCRIPTION
1	See Hoode as follows-	4	Washers
1	R. H. Handle	2	Legs
1	Li. H. "	2	Bolts 1/2" x 9 1/2" Cyl. Head
4	Hoode Crosspieces	2	" 1/2" x 5" " "
2	" Pins	2	" 3/4 x 3 1/2" Cyl. Head
		2	" 3/4 x 5 1/2" " "
		2	" 3/4 x 3 1/2" " Washers
1	See Hoode as follows-		
2	Wheels		
2	Guards		
1	Noel		
1	Arle		

John Brown Order Dept.  
5-21-15  
OVER

Blank for Recording Details of Shipments, Especially on Export Business

when he is in charge of the shipping, it saves a lot of his time.

We have as many as a dozen different packing lists for the same implement; one export customer wants certain parts added to suit his peculiar conditions, while the next customer could not use these attachments but requires others in their place. On each filled-in form we write the customer's name, the order number, and make a copy of his particular mark. Six months, or possibly a year later, that customer places his order for machinery the same as was furnished on his order of — date. Or he will want the same equipment excepting a change in this or that part. But whatever his requirements may be and no matter how long afterward he may reorder, we can make a quick comparison between his previous orders and his latest one.

This form is printed and ruled on both sides. A larger or small sheet can be used as required. Where export shipments are made strictly according to catalog, without any deviation, then this form will not apply; but the writer has not yet found the machine or implement that is shipped exactly alike in all particulars to various customers in different parts of the world.

## Conserving the Manganese in Pig Iron in Making Steel

The conservation of manganese additions to steel is an important topic in the face of the present possible shortage of ferromanganese.

William R. Walker, of the United States Steel Corporation, New York, has formulated a process which is designed to wholly or largely avoid the addition of manganese to steel and to utilize the larger portion of the manganese contained in the pig iron. The method is incorporated in a patent (U. S. 1,155,849—Oct. 5, 1915). It relates to the manufacture of steel by the use of the electric furnace succeeding or supplementing the Bessemer converter or open-hearth furnace. It is designed to reduce the expense of manufacture and make the steel more uniform and better in quality.

In the usual process of making steel, the manganese in the pig iron is almost wholly lost through oxidation in the Bessemer converter or open-hearth furnace, rendering it necessary to add manganese to obtain the desired quality of steel. This manganese in the pig iron is said to perform a very useful function in the electric furnace owing to its effect on the oxidized iron of the bath. It has been considered necessary to reduce the manganese to a small proportion of the original amount in the Bessemer or open-hearth heat, necessitating the replacement of the manganese by additions.

Mr. Walker states that when Bessemer converter or open-hearth steel is used in connection with an electric furnace, he can obtain important advantages by stopping the heat short of the usual point and at a stage when the major portion of the manganese is retained in the bath; that where a series of converters or open-hearth furnaces is used, variations in the manganese content of the partly reduced heat may be equalized by supplying a mixer, adapted to hold several heats, between the converters or open-hearth furnaces and the electric furnace. Such a mixer provides a constant and steady supply of metal to the electric furnace while equalizing the percentage of metalloids and affording a more uniform product from this furnace.

Besides the mixer, the patentee also provides a receiver or ladle on the casting side of the electric furnaces, adapted to hold charges from a number of these at one time. From this the metal may be tapped into ladles and poured into molds. This additional receiver is claimed to aid in equalizing the variations in product of the various electric furnaces. The mixer and receiver may be heated by electricity or gas, etc.

In carrying out the process, Mr. Walker stops the heat of the Bessemer converted or open-hearth furnace before it is carried to the usual point and while the major portion of the contained manganese, above 0.10 per cent, is present in the metal. After tapping these heats into the mixer charges are taken from this into the electric furnaces, carrying a larger proportion of manganese than is now obtained. The manganese largely deoxidizes the metal in the electric furnace. Thus the addition of manganese to the electric furnace is claimed to be largely or wholly avoided.

The converter is preferably acid-lined and the open-hearth furnace either basic or acid, but the electric furnace is preferably basic.

The Cuyahoga Spring Company, Cleveland, Ohio, has leased the plant formerly occupied by the Ideal Peerless Mfg. Company, on Waterloo Road, and has moved into its new quarters. The plant is a one-story building and provides factory space of 15,000 sq. ft. J. H. Van Uum is president and general manager.

## AN UNUSUAL ROUGHING MILL

## A German Three-High Two-Pass Unit of Unique Design and Special Advantages

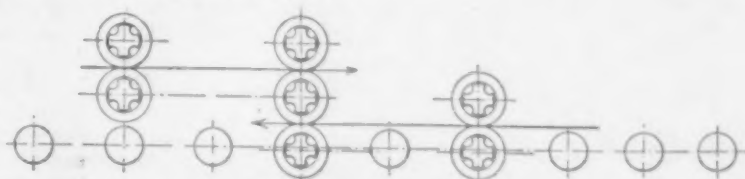
An interesting description by Bruno Quast of Köhn-Kalk, Germany, of a special patented roughing mill for merchant bar mills is contained in the issue of *Stahl und Eisen* for June 3, 1915. The mill occupies but little space and is particularly designed to be applied to existing mills. It consists of a three-high stand with a two-high stand arranged on each side, as shown in diagram form in one of the illustrations. At each passage the piece makes its first pass through one of the two-high stands and its second through either the upper or lower pair of the three-high stands. It is rolled backward and forward exactly as in an ordinary three-high mill but with the advantage that at each pass the piece receives two reductions. The rolls of the middle stand must evidently have a greater speed of revolution than the others, and at one plant where the average roll diameter of the special mill is 425 mm. (16 3/4 in.) the speed is about 100 r.p.m. for the outside stands and about 130 r.p.m. for the three-high central stand.

The finishing train has an average roll diameter of 325 mm. (12 51/64 in.). Provision is made for a second finishing train with an average roll diameter of 275 mm. (10 53/64 in.) which will roll wire rod in connection with the other finishing stands. The sizes rolled in the mill at present are:

Rounds, 8 to 40 mm. dia. (5/16 to 1 37/64 in.)  
Squares, 8 to 40 mm. sq. (5/16 to 1 37/64 in.)  
Angles, 20 to 60 mm. leg. (25/32 to 2 23/64 in.)  
Flats up to 75 mm. wide (2 61/64 in.)  
Hoop iron, 50 x 1 to 70 x 6 mm. (1 31/32 x 1/32 to 2 1/4 x 15/64 in.) and similar sections.

The special roughing mill takes billets of 130, 100 and 70 mm. square (5 1/8, 3 15/16 and 2 3/4 in.), weighing from 66 to 660 lb., and furnishing bars to the finishing train 64, 54, 50, 42, 35, 25 and 21 mm. square (2 1/2, 2 1/8, 1 31/32, 1 21/32, 1 3/8 x 63/64 in., and 53/64 in.), after three or five passes. For the small sections short billets have to be used, and in order to handle them small rollers are placed

diameter is 500 mm. (19 11/16 in.) and the product will be finished in the present mill with rolls 450 mm. (17 23/32 in.) diameter. Billets 150 and 130 mm. square are to be rolled (5 29/32 and 5 1/8 in.), weighing about 330 to 770 lb. In order to meet the requirements of the finishing train the special roughing is arranged to furnish without changing 8 different sizes from the larger billet in three passes, and 11 sizes from the smaller billet in three passes.



Scheme of Special 3-High, 2-Pass Roughing Mill

In conclusion the plans are given in some detail for a combined wire rod mill, small bar mill and hoop iron mill, together with the special roughing mill, the installation of which is planned by a large plant outside Germany. Three sizes of billets are to be used, 125, 95 and 65 mm. square (4 59/64, 3 3/4 and 2 9/16 in.). The requirements of the finishing stands are naturally very varied, and it is planned to deliver 17 different sizes from the roughing mill without any changes of rolls or guides being necessary.

G. B. W.

## Water Shipments of Iron Ore from Port Henry

Cities at the head of navigation of the Hudson River are counting on the possibility of a heavy increase in iron-ore shipments on the opening of the Champlain barge canal. It is figured that there is the possibility of an annual shipment by way of this canal and the Hudson River of 1,000,000 tons of ore from Witherbee, Sherman & Co.'s mine properties, now delivering to Port Henry, N. Y., where there is a blast furnace which has been used for smelting the Adirondack ores. Though there is talk of smelting some of the ore at say Troy, N. Y., most emphasis is placed on the reduced price which the ore may be laid down for in New York harbor. Against the present rail rate of \$1.15 per ton, it is expected that ore may be carried by water for 50 cents per ton, a saving of 65 cents per ton.

There is considerable agitation at Albany, also, looking to a deepening of the upper stretches of the Hudson to allow the passage of ocean-going ships, an arrangement which would favor an extension of the market which the ore could reach. With the large iron-ore deposits of New York State, much of them of low phosphorus, and the Port Henry furnace tests proving the feasibility of reducing the titaniferous ores, the iron industry of New York is expected to take on larger proportions with improved water transportation.

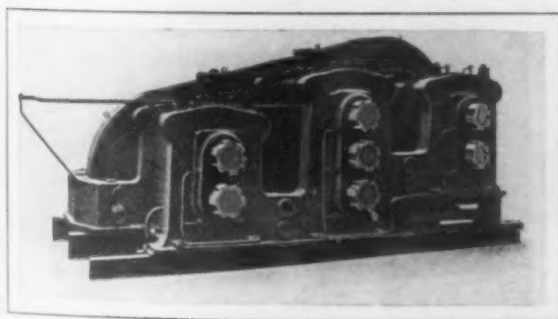
## July Exports of Zinc

The Department of Foreign Commerce at Washington has issued for the first time separate statistics of the exports of zinc pigs and bars and of zinc plates and sheets. For July, 1915, they were:

Pigs and Bars:	Gross Tons	Value
From domestic ores.....	1,216	\$492,782
From foreign ores.....	1,676	476,895
Plates and sheets.....	4,124	1,311,040
Total .....	7,016	2,280,717

This is the smallest total since March, 1915. In July, 1914, the total was only 140 tons. For seven months to Aug. 1, 1915, the total exports of zinc as pigs, bars, plates and sheets were 64,486 tons, against 880 tons to Aug. 1, 1914, and 6260 tons to Aug. 1, 1913.

The manufacture of pipe from iron ore to finished product is to be shown before the Technology Club of New York on Friday evening, Oct. 22, by means of the motion pictures taken under the direction of the National Tube Company.



The German 3-High, 2-Pass Roughing Mill of Special Design

between the stands as shown in the illustrations. Guides and passes are arranged to take the three sizes of billets mentioned above and furnish the sizes required for finishing without roll changes being necessary. Two hundred tons and more are easily rolled per shift. Two rollers, one before and one behind, and a young helper are all that are necessary.

A second roughing mill of the same sort has been installed at a large plant in Lorraine and should shortly be in operation. The average roll

# Patternmaking for Molding Machine Work\*

## The Relative Merits of Various Metals for Patterns—Methods of Making Pattern Plates and Principal Requisites

—BY E. I. CHASE†—

Split-wood patterns made for ordinary molding are disappointing in results when put on plates, because of their liability to bruise or chip off in the process of peaning. Wherever possible, a cast-iron pattern should be given first choice, but it has one drawback in not taking the solder well. A considerable amount of soldering is sometimes necessary, especially where the pattern is subject to numerous alterations and retouching after it is finished.

### METAL PATTERNS

Brass patterns are desirable, but wear faster and are more easily marred and dented than those made of iron. White metal patterns are in demand for rush jobs and a limited production; they are easily filed, soldered and fitted. For patterns of good weight and size they tie up considerable money. They are softer than brass and wear faster. The best thing that can be said of aluminum patterns is that they are light, and, especially for very large jobs such as automobile engine bases, this property has great advantages. As a pattern material, however, it has several faults. Aluminum is hard to



Fig. 1—The Wrong Way to Provide for Pockets of Sand Shown at X; a Better Way Shown at Y.

solder, has a high and inconsistent shrinkage, is soft and no aluminum solder will hold pieces on patterns when used for any length of time on jarring machines or where a vibrator is used.

I have made aluminum pattern plates with the patterns cast integral with the plate, but have found them disappointing. After some little experimenting along this line, we rammed the pattern castings in a tightly pinned wooden flask, separating the cope and drag with a  $\frac{3}{8}$ -in. planed iron plate, having the outline of the pattern plate cut out. This was used to chill the outside, and the profile of the cut-out was made with a 5-deg. bevel to permit the aluminum cast plate to be extracted easily and without bending. Before closing the mold, the parting was carefully thumbed to make a fillet where the pattern joined the plate, to prevent shrinkage and consequent undercut. In spite of this care, however, the plates were unsatisfactory, principally because the center was thinner than the outer margin, notwithstanding the use of risers to feed it. The resulting plates might do where a variation in casting-thickness could be overlooked, but as both cope and drag, rammed from these plates, had a convex surface of from  $\frac{1}{64}$  to  $\frac{1}{32}$  in., the mold would be liable to crush and distort the castings. It is only fair to state, however, that many shops, especially stove foundries, have solved many of the difficulties of making these plates and

use them extensively. It is possible that the trouble encountered by us was due to making the plates too thick.

### THREE-PART MOLD OR COVER CORE

Another point to be considered is whether, when the design of the pattern requires two partings, it is better to make it a cope, cheek and drag job, or to use a cover core instead. The employment of cover cores is less expensive, and they insure a greater output of molds. Deciding this point is a matter of experience and judgment, and the policy of the foundry for which the pattern is made also is a controlling factor. Where loose bosses or brackets are to be taken care of, cores either must be provided to cover them, or, where possible, they should be used as drawbacks to be withdrawn from the sand into the pattern after ramming is finished. This can be accomplished by suitable levers or screws located underneath the pattern plate and connected inside of the pattern by slides or cams, with sufficient throw to draw them clear of the mold. These drawback pieces must fit practically sand-tight but loose enough not to jam as a result of ramming. It is possible, where there is sufficient inside pattern room, to fit three or four drawbacks to one cam located parallel to the pattern plate, so that by one motion of the lever or screw, they may be drawn in simultaneously. It might be well to state that these loose pieces should be withdrawn after all rapping on the plate is completed and when the pattern plate is to be raised from the flask.

Frequently, a boss projecting from the pattern may be cared for by leaving it loose and fastening it to the pattern, either with wires loosely fitted to holes drilled in the boss, or preferably by attaching it to the pattern with dovetails. Where dovetails are used, they should have a good taper lengthwise, so as to leave the pattern easily as it is drawn from the flask. The fastening of bosses to the pattern by loose wires is not to be recommended on account of the liability to ram out of position after the wires are withdrawn; sometimes they may be used for a limited output of castings. Any method of holding bosses which is not positive is likely to be unsatisfactory. The more mechanical the method, the more foolproof it is.

### IRREGULAR PARTINGS

Some patterns must be made with an irregular parting, which will necessitate pockets of green sand in the drag or cope. In such a case it is desirable to give the sides of these pockets all the draft possible, not less than 30 deg., though more is preferable, on account of the liability to shave or crush the sand when closing on the cope. Besides giving good draft to these pockets, they should have all the spread possible, as the narrow pocket is more liable to drop than one given more width. Large draft on pockets is essential on patterns used on jolt machines, as it tends to prevent the cracking of sand which happens when the sides of the pocket form a more acute angle. Also, sharp edges should be avoided, and the patternmaker can save considerable

\*From a paper read before the American Foundrymen's Association, Atlantic City, Sept. 27, 1915.

†Cadillac Motor Car Company, Detroit, Mich.



after-work by watching where to make round corners and fillets. In Fig. 1, the pocket of sand at X is more liable to drop or crush outwardly into the mold, than the one at Y.

A good way to take care of these pockets is by screwing pads to the plate under the projecting parts of the pattern and giving these pads all the draft and spread possible; then, after removing this half of the pattern and securing the cope and drag plates together, babbitt metal can be poured through holes drilled in the bottom of the corresponding plate. If this is well done and the plates have been previously heated, the shrinkage of the babbitt does not affect the parting line of sand in the drag and cope. This is a cheap, quick, and the best method of accomplishing the fitting of cope and drag plates, as the pad can be easily worked on, and the corresponding pocket is automatically fitted by the melted babbitt. Plates fitted in this manner have given a production of 15,000 to 20,000 castings without showing appreciable wear.

Before pouring the babbitt, plenty of anchor holes must be drilled in the plate to secure the babbitt and to prevent it from loosening by vibration or jar-ramming.

When the design of the casting permits, it is sometimes better to put the chaplet boss in the core, which does away with the operation of grinding it from the rough casting. Enough metal in the boss must be allowed to make the casting air tight. We have drilled holes to the proper depth through bosses and have rammed the chaplets in position on the pattern. Also, we rammed small, round steel punchings, about 5/16 in. in diameter in the cores where the chaplets bear. Where the chaplet stems are small, and no metal bearings are used for them in the core, it is not uncommon to find, that from the pressure of the metal and the softening of the core, the chaplet has penetrated the core and has permitted it to be misplaced.

#### PLATING PATTERNS

With reference to plating patterns for different types of molding machines, we must consider the size, shape and depth of pattern when deciding what type of machine to use. A deep pattern will necessitate a deep draw and would go well on the roll-over or stripping plate type of machine, or modifications of these; a choice will depend upon the shop for which the pattern is to be made. Again, heavy patterns need a power machine. For small squeezers, using flasks about 12 x 18 in., the pattern can be put on a rolled steel plate, preferably not less than 1/4 in. thick, to avoid springing in ramming. We find it better to use a 3/8-in. aluminum plate, cut from rolled stock, to avoid planing, on account of the tendency of steel to rust and flake off, unless well looked after, especially where the plates are stored for a considerable period between orders. These plates must be carefully drilled with a jig to insure fitting the flasks, and the use of renewable, hardened steel bushings is recommended. These are inserted in pattern plates to prevent undue wear and to preserve uniformity with original drilling when new bushings become necessary.

#### MOUNTING SMALL PATTERNS

When small patterns are mounted on these plates, they usually are located on both sides, for cope and drag, but in a great many cases where no cores are to be set, which would have to hang in the cope, half the pattern cost can be saved by putting both cope and drag halves of the pattern on one side of the plate. Patterns on one side of the

plate are especially suitable for jar-ramming machines. This practice is not recommended, however, where there are a large number of small patterns in a flask, on account of the liability to ram away, and also, because a very small shift looks unusually large on a small casting. If the pattern plate and the flasks do not have hardened steel bushings, a small shift can easily be doubled in size.

In Fig. 2, at A, it would seem that the patterns were not mounted properly in relation to the center line, and the difficulty at B appears to have been caused by ramming-away at X. This indicates that the patternmaker should allow all the draft possible on plated patterns, and should avoid sharp corners, especially where core prints and pattern meet. In the latter instance I recommend a fillet in most cases as it is more desirable to grind off a slight fin than to have a core crush in the mold, and thus get a dirty casting. Where patterns are put on one side of the plate for both cope and drag, they may be laid out by templates, by center lines and by paper. Where there are only one or two patterns in a flask, I prefer working by center lines, although templates may be used. The most commonly used template is a metal plate about 1/8 in. thick, drilled to match dowel-pin holes in the drag halves of patterns and reversed on flask pins to drill the other side of the center line of the plate for the cope halves.

#### PLATING PATTERNS WITH PAPER

When putting a large number of patterns on a plate, the cheapest and quickest way is by means



Fig. 2—The Patterns at A Were Not Properly Mounted in Relation to the Center Line and the Difficulty at B Appears to Have Been Caused by Ramming Away at X

of paper. The paper should be suitable for the work, and very good results are obtained with gasket paper, about 0.015 in. thick. This method consists in plating one-half of the patterns on one side of the center line and then removing the patterns and replating them with the paper underneath. With a sharp, pointed knife cut carefully around the patterns and reverse on the flask pins, and the other halves of the patterns will fit in the outlines while the screw holes are marked and prick-punched. Exercising care in cutting the paper and drilling the plates, accurate work will result. When the patterns have been screwed to the plate it is well to drill through both patterns and plate for close-fitting dowel pins, to prevent shifting. The patterns, in all cases, must be securely fastened to the plate, preferably by screws, as rivets will work loose.

When we consider large patterns that are heavy enough to necessitate the use of roll-over machines, we usually mount cope and drag on separate plates using two machines side by side. In some instances, where the output, as in a case of this kind, is large, we use a battery of machines making the same casting. It will be found good practice to make the core fit the drag pattern accurately in length, and to make the cope prints from 1/16 to 1/8 in. longer, to prevent shaving when closing the mold.

Swedish imports of pig iron were only 35,660 tons for the first six months of 1915 compared with 47,894 tons in the same period in 1914.

ESTABLISHED 1855

# THE IRON AGE

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## High Prices and High Quality

It is not infrequently noticed that a manufacturing concern will advertise that its product commands a higher price than competing products due to the care which is exercised in manufacture, with a resulting higher quality of finished product. The idea that high price necessarily means high quality is one that has obtained a firm grip upon the minds of a large portion of the public. As a matter of fact, in many cases the reverse is true. High price can, and often does mean, an inferior grade of workmanship.

The manufacturer who has built up his business to a point where he produces in large quantities has found it not only desirable but necessary to standardize his manufacturing. He does it to such an extent that the various parts of his product will go together with little or no fitting when they reach the assembly floor. This condition of affairs presupposes a high standard of maintenance in his tools and equipment, and the establishment of rigid standards of quality in the product of his machines, both as regards limits of error in workmanship and the degree of finish given to the various parts. It also presupposes an inspection system of the most rigid character which will reject, before they reach the assembly floor, all parts which are defective as regards size, quality and finish. Therefore all material which is assembled into the final product represents workmanship only of the highest class. Quantity production could not be carried on if any of these features were neglected.

On the other hand, the manufacturer who has not reached the stage of quantity production is not handicapped by having to dispose of a great volume of component parts each day. He can spend more time in fitting the parts to each other and in correcting defects in workmanship. Such a procedure costs money, and it is much better both from a manufacturing standpoint and from that of the cost of the product to finish a part to size in the original operation than to depend upon filing and scraping on the assembly floor. A visit to many of the shops which advertise high quality as an excuse for high price will often reveal an excessive amount of work being done in assembling which should have been done in the original machine operations.

Another reason for high prices may be high

selling cost. A manufacturer making only a limited amount of product cannot, as a rule, afford to introduce the refinements in manufacturing which go with large production and permit a low price to be made on the article. The manufacturer without such refinements must first charge more for his product in order to meet the difference in manufacturing cost, and then in order to effect his sales in competition with the product of the manufacturer who has reduced his costs by quantity production, must expend more in the sales department, thereby adding still further to the final cost of his product. The idea that high price and high quality go hand in hand is an economic fallacy.

## Our Crippled Railroads

Earlier than had been expected, shippers are finding a perceptible shortage in the supply of cars. The net surplus of cars Oct. 1, according to the American Railway Association, was 78,299, against 185,000 Sept. 1, and it is understood that this surplus has since been heavily reduced. The surplus is not distributed evenly over the country, but in some sections, especially where traffic is heavy, a decided shortage is experienced. Coming thus early in the season, it may be expected that when the movement of grain approaches its maximum complaints from shippers will be general.

The Interstate Commerce Commission appreciates the situation and is mildly endeavoring to alleviate the troubles of shippers by urging them to unload cars promptly and thus return to the railroads the empty cars for re-use as speedily as possible. The members of the commission evidently feel that on their shoulders lies much of the responsibility for the plight of the railroad companies, in not having supplied themselves with new cars to take the place of discarded ones and also to meet the requirements of progressively increasing annual traffic. If the commission had yielded to the arguments and pleadings of business interests they would long ago have permitted the railroad companies to charge sufficient rates for transporting freight to enable them to secure the means for equipping themselves adequately. Not only do the railroads require more rolling stock, but the need is also felt of enlarging their facilities generally for handling the growing traffic of the country. The large railroad systems have been

able to do this, but the great majority of the railroads have been too poor to indulge in expenditures for such purposes. Many of them, in fact, have not been in a financial position to do more than maintain their tracks and rolling stock in safe condition. Perhaps a serious congestion of railroad traffic this winter may arouse the country to the unfortunate condition into which the shortsighted policy of the commission has brought the railroads. It will be a costly way, however, in which to demonstrate that a more enlightened method is needed of regulating railroad interests.

### By-Product Coke

There is more building of by-product coke ovens now than at any previous time, probably, with the exception of the period some five years ago, when a very large number were under construction. The Geological Survey, whose pamphlet report on the coke industry in 1914 became available this week, reported 1200 by-product ovens as under construction Jan. 1, 1911, and 644 ovens under construction at the beginning of the present year. The number has been considerably augmented since then.

In quarters not entirely familiar with the ins and outs of the by-product coking industry the European war may be regarded as responsible for much of the present building of by-product coke ovens. This is not a correct view. The war has created a strong demand for certain by-products, but it is not necessary for the United States to build additional by-product ovens in order to secure these by-products in large quantities, for the reason that as a rule the ovens already built have not been recovering the finer by-products. The quick way to secure them is not to build by-product coking plants from the ground up, but to add the necessary departments to by-product coking plants already in operation.

There were 5809 retort coke ovens in completed form at the beginning of this year, perhaps five or six times the number of ovens now actually in course of erection. Their recovery of the finer by-products was very small. The Survey reports the value of by-products in 1914, secured in the manufacture of 11,219,943 net tons of by-product coke, as follows:

Gas .....	\$6,009,583
Tar .....	2,867,274
Ammonia sulphate or equivalent.....	4,696,590
Ammonia liquor .....	658,497
Anhydrous ammonia .....	2,300,137
Total .....	\$16,532,081
Other by-products .....	997,007
Total by-products .....	\$17,529,088

The "other by-products" thus constituted but 5.7 per cent of the total value of by-products, which is a very small percentage considering the possibilities. There is a footnote stating that the "other by-products" embraced benzol chiefly, and the benzol production, although small, represented evidently a large increase over the similar recovery in previous years.

In tar and ammonia products there has been no large increase in the past two or three years in the recovery per ton of coke produced, and it

may be assumed that the recovery has been almost complete, but the recovery of benzol and the various materials with somewhat weird names that have been mentioned since the war started has evidently been an almost disregarded subject in the past.

Possibly the first by-product thought of, years ago, when by-product coking began to be seriously considered by the iron industry at large, was the gas, not only the most readily recovered of all the products, but the one which the producer himself could use and which therefore did not present the menace of a possibly glutted market in future. It is interesting to note, therefore, that, while every effort has doubtless been made from the outset to recover all the gas possible, the recovery has been increasing up to date. Per net ton of coke produced, the gas in 1912 amounted to 4900 thousand cubic feet; in 1913 to 5080 thousand feet and in 1914 to 5460 thousand feet, showing an increase of over 10 per cent in the last two years, when it might have been supposed that not much further improvement would have been possible. The value of the gas was rated at 8.5 cents per 1000 cubic feet in 1912, 8.8 cents in 1913 and 9.8 cents in 1914. The values are of course largely geographical, as they must necessarily vary with the distance from coal and natural gas fields. The value would be several times as great at Duluth, Minn., for instance, as at Duquesne, Pa., or even at Farrell, Pa., or Gary, Ind., where, unlike Duquesne, coke-oven gas really is produced. The values of gas are of course only estimated. Some of it is sold to domestic consumers at 10 to 40 cents per 1000 feet, while some is charged to jointly-owned works at as low as 2.5 cents.

Unfortunately the values of beehive and retort coke produced, and the values of the coal used, given in the Geological Survey report, are not susceptible of analysis, because as a rule the freight from the coal mine to the blast furnace is paid by the coke in the case of bee-hive and by the coal in the case of retort practice. The figures are presented in the only form in which they could be secured, doubtless, but when they show that the average value of by-product coke was \$3.39 per net ton, against \$2.15 for beehive, while the value of coal required to make a ton of coke was \$3.19 for retort and \$1.67 for beehive, it is evident that the figures are meaningless in themselves. Nor is it of much interest to note that the difference in value between the coal used and the coke produced was 20 cents in retort practice and 48 cents in beehive practice. The figures are necessarily based upon estimates made largely by producers for book-keeping purposes. The great Connellsville coke region, indeed, has few data upon which to estimate the value of its coal, for most of it is at a freight disadvantage with respect to gas and steam coal districts.

The increasing production of by-product coke, together with prospective further increases through the completion of retorts now being built, on the one hand, with a rapidly increasing demand for coke on the other hand, has produced such a delicate poise that the coke market has been very sensitive of late to the by-product influence. For instance, some Connellsville coke operators have quoted lower prices for their product for delivery



over the whole of 1916 than they would quote for delivery over the first six months only, not on the ground that coke consumption will be less in the second half of the year than in the first half, but from the fear that so many by-product ovens will be completed between now and next July that the demand for beehive coke will eventually be materially reduced. Again, the market for Connellsville coke for spot shipment underwent a sharp advance late last week, which was attributed largely to the buying by an interest which merely needs to tide over until its completion, within a very few weeks, of additional by-product ovens.

## CORRESPONDENCE

### Scientific Salesmanship

*To the Editor:* Following the example of the Carnegie Steel Company, the American Steel & Wire Company has instituted a new scheme of training salesmen. It makes them learn thoroughly all the practical details of the manufacture of the product it is their business to sell. This, with the idea, of course, that better salesmen are made of them thereby. But a mistaken idea, it would seem, although it has a certain plausibility in it. Reflection shows it to be a waste effort; for there are only two general factors in successful salesmanship and this practical works knowledge helps neither of them very much, while there is other knowledge that would vastly help. These two factors are:

1. Knowing the strong points of the article or the goods to be sold. But learning by actual observation or worse still by actual work all the details of their manufacture in order to get this knowledge would be like Charles Lamb's ancient Chinese method of getting roast pork by burning down pig sties—an unnecessarily costly way.

2. Gaining the respect and liking of the prospective buyer; and here practical manufacturing knowledge hinders rather than helps. For the buyer is not interested in this and would speedily be bored. He is interested in his own manufacturing details, or business details, but not in other people's not in his immediate line. And if the salesman could discuss the former with him intelligently, then indeed he would advance the good cause. So this is what he wants to learn if he can—his customer's business and not his employer's business. Not much better the latter, indeed, then baseball lore and the latest "good" story. But these two varieties of knowledge do not inspire respect and respect counts heavier than liking. So next in importance to understanding his customer's business is understanding some subject that is of vital importance and of supreme interest to each one of his customers without a single, solitary exception. That subject is good business, and political economy is, therefore, the most important study the salesman can take up.

Some study it is important for him to take up, as the Carnegie Steel Company and the American Steel & Wire Company see, and their course of study is better than no study at all. For the respect of the salesman's customer is of far more account than their liking, and knowledge is needed to inspire respect. The importance of respect is illustrated when the sober and care-worn manager or member of the firm for once drops his regular work and takes to the road. He succeeds better than the jovial and light-hearted regular salesman, with his sociability and good fellowship. The time has gone by for the salesman to sally forth armed only with a parrot tale of superiority of goods, a cigar and a nasty story. But what the advocates of works training for salesmen do not see is that they should rather turn their salesmen loose upon their customers' works or the literature pertaining to them

and upon John Stuart Mill and succeeding political economists. Why business is poor or good, as the case may be, how long it will stay so, what would make it better, etc., etc.—all this would interest the customer only less than a discussion of his own immediate plant or business problems; while the seller's problems would not interest him one little bit.

Well for a salesman while he is home, if he interest himself in his employer's problems; but to learn all the details of manufacturing—nein! (We may as well start in to learn German awhile for Germany will probably be after us after she has scooped in her immediate neighbors and her supply of culture holds out.)

But coming to the general sales manager, the case becomes different again. For just as truly as it is in large measure a waste for the ordinary salesman to learn the practical manufacturing details of his own works, so it is a waste for the general sales manager to study political economy very closely. The works should be his study, it would seem, so that he can readily decide upon the possibility of making unusual specifications fit in with the regular works practice and how they best can be made to fit in, etc.

The "engineer-salesman," who while on the road lightly and offhand settles with his customers unusual technical details without any consultation with the general sales manager, must ever remain a sweet, sweet vision and a foolish, foolish dream.

GEORGE AUCHY.

Tacony, Philadelphia, Oct. 14, 1915.

### The Benzol Output by Steel Plants

The steel companies of the United States are now producing about 15,000,000 gal. of benzol per year, compared with 3,000,000 gal. before the war, according to I. F. Stone, president National Aniline & Chemical Company, in a recent address before the New York section of the American Chemical Society. He stated that the demand for this product is so great for war purposes that the increase is inadequate to supply it. Prices are therefore so high that those who use benzol for ordinary manufacturing purposes are seriously inconvenienced. Predictions of still larger increases in the production were made, so that the German domination of the past would be no more heard of. The partial substitution of benzol for gasoline in automobile propulsion he predicted as certain because the price would fall ultimately to a level with gasoline.

At the same meeting the strong necessity for tariff protection against foreign competition was emphasized by other speakers.

### Cleveland Iron and Steel Institute Meeting

Samuel Mather is to address the Cleveland meeting of the American Iron and Steel Institute at the morning session, Friday, Oct. 22, on "Cleveland and Its Industries." According to the monthly bulletin of the Institute, it is thought that there will be a waiting list by the time of the Cleveland meeting, as the present active membership numbers 1210 of a possible total of 1250, and the total number of associate members is 165 with a limit of 250.

### National Founders' Annual Meeting

The National Founders' Association will hold its nineteenth annual meeting at the Hotel Astor, New York City, on Nov. 17 and 18.

Representatives of the Danish iron industry, after a trip to Russia to investigate the prospects for export trade there, report the outlook excellent because Russia will need enormous quantities of iron and steel. Danish firms, it is stated, are able to make favorable contracts if goods are made precisely in accordance with Russian requirements.

The winter meeting of the American Institute of Chemical Engineers will be held in Baltimore, Md., Jan. 12 to 15, 1916.

## Bethlehem Acquires Pennsylvania Steel

While the finalities have not been concluded, it is definitely known that the Pennsylvania Steel Company, with all its subsidiaries, will shortly be acquired by the Bethlehem Steel Corporation. The Pennsylvania Railroad interest has been secured and it is understood that in a few days the interest controlled by the Reading Railroad will be bought. The price realized is stated to be \$100 a share for the preferred stock of the Pennsylvania Steel Company and \$35 for the common stock. Payment, it is reported, may be arranged through bonds bearing interest at five per cent and guaranteed by the Bethlehem Steel Corporation. It is further reported that the bonds issued for the common stock may not bear interest for a period of five years. The price paid will make the Pennsylvania properties cost the Bethlehem Steel Corporation \$49,533,000.

It is further reported that the organization of the Pennsylvania Steel Company will be continued, the Bethlehem Steel Corporation simply acting as a holding company. The transaction will not necessitate any change in the stock capitalization of the Bethlehem Corporation. The two companies have not been trade competitors, as their products have been diverse except as to steel rails and structural material. The acquisition of the Pennsylvania Steel Company is especially important from the standpoint of the supply of iron ore. Through its subsidiary, the Spanish-American Iron Company, it has a very large deposit of iron ore in Cuba, the chrome-nickel contents of which are particularly desirable in the manufacture of such products as are made by the Bethlehem Steel Corporation. The acquisition of another subsidiary, the Maryland Steel Company, will give the Bethlehem Corporation a large steel plant located directly on tidewater, at Sparrows Point, Md., including a well-equipped shipyard.

### New Installations of Heroult Furnaces

Recent licenses to install Heroult electric steel furnaces, granted by the United States Steel Corporation, are the following:

The Simonds Mfg. Company, Lockport, N. Y., will erect a 6-ton furnace for making special steels, principally for saws. The company is now operating a 1-ton Girod electric furnace as well as a large crucible steel department.

The new steel plant at Baltimore to be erected by Henry Hess of Philadelphia, as announced in THE IRON AGE of Oct. 14, will use a 6-ton Heroult furnace for making high grade steels for rolling into bars, etc.

The Electric Steel & Metals Company, Ltd., at Welland, Ontario, will erect a second 6-ton furnace for making steel castings. It has a 6-ton Heroult furnace now in operation.

These three new installations make a total of thirty Heroult furnaces in operation or contracted for in the United States and Canada.

The dyestuff situation will be discussed at a meeting of the Society of Chemical Industry, New York Section, to be held at Rumford Hall, 50 East Forty-first Street, New York, on Friday evening, Oct. 22, opening at 8.15. The program comprises addresses and discussions by E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, Washington, D. C.; J. F. Schoellkopf, of the Schoellkopf, Hartford & Hanna Company, Buffalo, N. Y.; Thomas H. Norton, commercial agent, Bureau of Foreign and Domestic Commerce; John P. Wood, president National Association of Woolen Manufacturers, and others. It is expected that the consumers of dyestuffs will be well represented and that many of those whose business is dependent upon the use of dyestuffs as well as those who are producers of these materials will take part in the discussion.

Construction of the new chemical laboratory building for the United States Bureau of Standards will commence at once. Wells Brothers & Co., New York, are to build it at a bid of \$188,556.

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### Thomas Iron Company Sought

The stockholders of the Thomas Iron Company have been notified that a meeting will be held at Hokenauqua, Pa., Oct. 27, at which they will be asked to vote on the question of giving an option on all the property of the company. The option, if given, will run for about four months, but may be exercised at any intermediate time. The name of the party asking for the option is not disclosed, but the statement is made that payment for the property will be either in cash or securities, at the option of each shareholder. The directors have made an estimate of what the proposed sale would net the stockholders and believe that they will realize about \$45 a share if the transaction is consummated. The company has outstanding \$2,500,000 capital stock of a par value of \$50. It operates eight blast furnaces in the Lehigh Valley and iron-ore mines in that locality and New Jersey, also owning important interests in various local railroads. The company was incorporated in 1854 and has therefore been conducting business for over 60 years. At one time it dominated the Eastern pig-iron trade.

The blast furnace of the Temple Iron Company, Temple, Pa., was blown in Oct. 13, after an idleness of more than a year. Miss Anita Broden, daughter of Albert Broden, superintendent of furnaces for the Reading Iron Company, applied the match. The stack will produce about 1200 tons of pig iron a week.

# The Iron and Metal Markets

## PRICES MOVING UPWARD

### Steel Makers Try to Check Buying

#### Foreign Demand Continues Heavy—Pig Iron Much More Active in Some Centers

Prominent features of the week have been advances in prices of many products and the apparent beginning of another buying movement in pig iron. The heavy demand for steel products continues, but this is now getting to be an old story. Among the price advances are \$2 per ton on wire products, \$1 on steel bars, shapes and plates, \$3 on chain, \$14 on ferrosilicon, 50c. on Southern pig iron, 50c. on Chicago foundry iron and \$1.50 on Chicago basic, with indications that pig-iron prices at other points will fall in line. Prompt coke is up 25c. per ton. The pig-iron market has responded rather slowly to the great activity and strength of steel products, but it now seems that the slack is to be taken up. Birmingham advices are that the sales of Southern iron the past week have considerably exceeded 50,000 tons, understood to include contracting by pipe makers. An eastern Pennsylvania steel mill has bought 50,000 tons of basic for second quarter delivery. The leading radiator company has bought heavily in various trade centers. Cincinnati sales agents report consumers in their territory coming into the market in earnest for their requirements for the first quarter and half. An inquiry has been received there from the East for 10,000 tons of basic iron for the first half. Southern furnaces are so well sold up that an export inquiry for 2000 tons of No. 2 soft cannot be placed.

It is interesting to note in this connection that the rising prices of pig iron have not brought out offers from holders of speculative iron. The large blocks held at Buffalo, Cincinnati and elsewhere will evidently not be peddled out until the market has gone considerably higher.

Railroads, having thoroughly wakened up, are now making themselves felt more strongly in the steel market. They are not only buying rails for 1916 but quite a number of systems are in the market for an aggregate of about 35,000 steel cars for early delivery and are also pressing contracts for needed bridge work. The Illinois Central has bought 55,000 tons of rails, the Great Northern 20,000 tons, the Santa Fe 15,000 tons and others have taken smaller quantities, while it is understood that negotiations are proceeding with additional buyers. Russia has placed 85,000 tons with the Lackawanna Steel Company and is said to be ready to order 60,000 tons more, while France wants 40,000 to 50,000 tons. The total quantity of rails thus far bought by Russia from the Lackawanna Steel Company is close to 200,000 tons.

Reports from every branch of the finished steel trade are of the most inspiring character. The advances in price now being made are partly for the purpose of checking the heavy influx of orders for delivery in the first quarter and half of 1916. The wire manufacturers state that their trade is the largest in its history. In other branches of the

steel business manufacturers are so swamped with work that they are back in deliveries four weeks or more, some products not being available for shipment on new orders under less than ten weeks. Much new business is, of course, coming from manufacturers having contracts for munitions of war for which they must purchase rounds and other finished forms, but in addition to this inquiries continue to be received from abroad for large quantities of the same class of material for use in foreign munition plants. The report comes by cable that the British Government may place an embargo on exports of steel for the purpose of safeguarding its own requirements. This would result in turning additional orders from neutral countries in our direction.

Manufacturing consumers face the difficulty of securing long-term protection by contracts for their raw steel materials. With two steel makers booked into next year without contracts, and others with contracts going well into the first half, buyers are likely to find monthly price settlements the new order of things. They are already meeting higher labor costs on sales made at the low levels of last spring and, securing no increased production with the higher labor item, they will need to make material advances over their own prices.

The steel trade is greatly interested in the loosening up of the ferromanganese situation. Shipments of British ferromanganese are now being received in greatly increased quantity and indications promise that the better movement will be continued. The threatened shortage of ferromanganese has thus been averted.

## A Comparison of Prices

### Advances Over the Previous Week in Heavy Types, Declines in Italics

At date, one week, one month and one year previous				
	Oct. 20,	Oct. 13,	Sept. 22,	Oct. 21,
<b>Pig Iron, Per Gross Ton:</b>				
No. 2, X, Philadelphia...	1915.	1915.	1915.	1914.
No. 2, Valley furnace...	\$16.25	\$16.25	\$16.25	\$14.50
No. 2, Southern, Cin'tl...	15.00	14.75	14.75	12.75
No. 2, Birmingham, Ala.	14.90	14.40	14.40	12.90
No. 2, furnace, Chicago*	12.00	11.50	11.50	10.00
Basic, del'd, eastern Pa.	14.75	14.25	14.25	13.00
Basic, Valley furnace...	17.00	17.00	17.25	14.00
Bessemer, Pittsburgh...	15.00	15.00	15.00	12.75
Malleable Bess., Ch'go*	16.95	16.95	16.95	14.90
Gray forge, Pittsburgh...	15.50	15.00	15.00	13.00
L. S. charcoal, Chicago...	14.70	14.70	14.70	13.40
	15.75	15.75	15.75	15.75
<b>Billets, etc. Per Gross Ton:</b>				
Bess. billets, Pittsburgh...	24.50	24.50	24.50	20.00
O.-h. billets, Pittsburgh...	25.00	25.00	25.00	20.00
O.-h. sheet bars, P'gh...	25.50	25.50	25.50	20.50
Forging billets, base, P'gh	34.50	34.00	32.00	25.00
O.-h. billets, Phila....	32.00	30.00	30.00	22.40
Wire rods, Pittsburgh...	32.00	31.00	30.00	26.00
<b>Finished Iron and Steel,</b>				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	1.559	1.559	1.509	1.12
Iron bars, Pittsburgh...	1.40	1.40	1.35	1.10
Iron bars, Chicago....	1.35	1.35	1.35	1.15
Steel bars, Pittsburgh...	1.45	1.40	1.35	1.31
Steel bars, New York...	1.619	1.569	1.519	1.15
Tank plates, Pittsburgh...	1.45	1.40	1.35	1.31
Tank plates, New York...	1.619	1.569	1.519	1.15
Beams, etc., Pittsburgh...	1.45	1.40	1.35	1.31
Beams, etc., New York...	1.619	1.569	1.519	1.15
Skelp, grooved steel, P'gh	1.40	1.40	1.35	1.15
Skelp, sheared steel, P'gh	1.45	1.45	1.40	1.20
Steel hoops, Pittsburgh...	1.50	1.50	1.35	1.25

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.



Sheets, Nails and Wire,	Oct. 20, 1915.	Oct. 13, 1915.	Sept. 22, 1915.	Oct. 21, 1914.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	2.00	2.00	1.90	1.95
Galv. sheets, No. 28, P'gh.	3.50	3.50	3.50	2.95
Wire nails, Pittsburgh...	1.85	1.75	1.75	1.60
Cut nails, Pittsburgh...	1.70	1.70	1.60	1.60
Fence wire, base, P'gh...	1.70	1.60	1.60	1.40
Barb wire, calv., P'gh...	2.70	2.60	2.60	2.00

Old Material.	Per Gross Ton:	Oct. 20, 1915.	Oct. 13, 1915.	Sept. 22, 1915.	Oct. 21, 1914.
Iron rails, Chicago...	\$13.50	\$13.50	\$13.50	\$11.00	
Iron rails, Philadelphia...	17.50	18.50	18.50	13.00	
Car wheels, Chicago...	12.00	12.00	11.75	10.50	
Car wheels, Philadelphia...	13.50	14.00	14.00	9.50	
Heavy steel scrap, P'gh.	14.50	14.00	14.25	10.75	
Heavy steel scrap, Phila.	14.50	15.00	15.00	9.50	
Heavy steel scrap, Ch'go.	11.75	11.75	11.75	8.50	
No. 1 cast, Pittsburgh...	12.75	13.00	13.00	11.50	
No. 1 cast, Philadelphia...	14.00	14.00	14.00	11.00	
No. 1 cast, Ch'go (net ton)	10.50	10.50	10.00	9.00	

## Coke, Connellsville.

Per Net Ton at Oven:	Oct. 20, 1915.	Oct. 13, 1915.	Sept. 22, 1915.	Oct. 21, 1914.
Furnace coke, prompt...	\$2.00	\$1.85	\$1.60	\$1.60
Furnace coke, future...	2.25	2.25	2.00	1.75
Foundry coke, prompt...	2.25	2.25	2.15	2.00
Foundry coke, future...	2.60	2.50	2.40	2.15

## Metals.

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	17.75	18.00	17.87½	11.50
Electrolytic copper, N. Y.	17.75	18.00	17.75	11.25
Spelter, St. Louis...	13.25	13.00	13.00	4.85
Spelter, New York...	13.50	13.25	13.25	5.00
Lead, St. Louis...	4.42½	4.42½	4.32½	3.35
Lead, New York...	4.50	4.50	4.50	3.50
Tin, New York...	33.25	32.75	33.00	29.00
Antimony, Asiatic, N. Y.	29.00	28.50	27.50	12.00
Tin plate, 100-lb. box, P'gh	\$3.15	\$3.15	\$3.15	\$3.25

## Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 29c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft. are considered ¼-in. plates. Plates over 72 in. wide must be ordered ½ in. thick on edge or not less than 11 lb. per sq. ft. to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3-16 in.	10
Gages under 3-16 in. to and including No. 8.	15
Gages under No. 8 to and including No. 9.	25
Gages under No. 9 to and including No. 10.	30
Gages under No. 10 to and including No. 12.	40
Sketches (including straight taper plates), 3 ft. and over.	10
Complete circles, 3 ft. in diameter and over.	20
Boiler and flange steel.	10
"A. R. M. A." and ordinary firebox steel.	20
Still bottom steel.	30
Marine steel.	40
Locomotive firebox steel.	50
Widths over 100 in. up to 110 in., inclusive.	45
Widths over 110 in. up to 115 in., inclusive.	10
Widths over 115 in. up to 120 in., inclusive.	15
Widths over 120 in. up to 125 in., inclusive.	25
Widths over 125 in. up to 130 in., inclusive.	50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	50
Cutting to lengths under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Products.—Prices to jobbers: Fence wire, Nos. 0 to 9, per 100 lb., terms sixty days or 2 per cent discount in ten days, carload lots, annealed, \$1.70; galvanized, \$2.40. Galvanized barb wire and staples, \$2.70; painted, \$2. Wire nails, \$1.85. Galvanized nails, 1 in. and longer, \$1.75 advance over base price; shorter than 1 in., \$2.25 advance over base price. Woven wire fencing, 69½ per cent off list for carloads, 68½ off for 1000-rod lots, 67½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Nos.	0 to 9	10	11	12	12½	13	14	15	16
Annealed	\$1.75	\$1.80	\$1.85	\$1.90	\$2.00	\$2.10	\$2.20	\$2.30	\$2.40
Galvanized	2.65	2.70	2.75	2.80	2.90	3.00	3.10	3.20	3.40

## Plain Wire, per 100 lb.

Wire Rods.—Bessemer, open-hearth and chain rods, \$32.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 1.45c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Aug. 16, 1915, all full weight:

Butt Weld			Iron		
Inches	Steel	Black	Inches	Black	Galv.
1½, 2 and 3.	72	46½	1½ and 2.	64	37
3½ to 4.	76	59½	2½ to 3.	64	37
4½ to 5.	79	63½	3½ to 4.	68	47
			4½ to 5.	71	52
Lap Weld					
2	76	60½	1½	55	36
2½ to 3.	78	62½	2	66	47
3 to 4.	76	58½	2½	67	49
4 to 5.	62½		3 to 4.	69	52
5 to 6.	60		4 to 5.	69	52
			5 to 6.	67	50
Reamed and Drifted					
1 to 3, butt.	77	61½	1 to 1½, butt.	69	50
2, lap	74	58½	2, butt	69	50
2½ to 3, lap.	76	60½	1½, lap	53	34
			2, lap	64	45
			2½ to 3, lap.	65	47
			3 to 4, lap.	67	50

Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1½, 2 and 3.	67	49½	1½	65	48
3½ to 4.	72	58½	2	67	49
4½ to 5.	76	62½	2½ to 3.	69	52
5 to 6.	77	63½	3 to 4.	68	51
			4 to 5.	61	44
			5 to 6.	56	39
Butt Weld, double extra strong, plain ends					
1½	62	48½	1½	58	40
2 to 2½.	65	51½	2½ to 3.	59	43
	67	53½	3 to 4.	61	45
Lap Weld, double extra strong, plain ends					
2	63	49½	2	57	40
2½ to 3.	65	51½	2½ to 3.	59	45
3 to 4.	64	50½	3 to 4.	58	44
4 to 5.	58	40½	4 to 5.	51	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap welded steel tubes and standard charcoal iron tubes, effective from Oct. 1, 1915, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1½ in.	45
2 in.	49
2½ in.	46
3 in.	53
3½ in.	57
4 in.	59
4½ in.	53
5 in.	
5½ in.	
6 in.	
6½ in.	
7 in.	
7½ in.	
8 in.	
8½ in.	
9 in.	
9½ in.	
10 in.	
10½ in.	
11 in.	
11½ in.	
12 in.	
12½ in.	
13 in.	
13½ in.	
14 in.	
14½ in.	
15 in.	

Locomotive and steamship special charcoal grades bring higher prices.

1½ in., over 18 ft., 10 per cent net extra.  
2 in. and larger, over 22 ft., 10 per cent net extra.

**Sheets.**—Makers' prices for mill shipment on sheets of U. S. Standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms thirty days net, or 2 per cent cash discount in ten days from date of invoice:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8.....		1.55
Nos. 9 to 10.....		1.60
Nos. 11 and 12.....		1.65
Nos. 13 and 14.....		1.70
Nos. 15 and 16.....		1.80

Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 10 and 11.....		1.65 to 1.75
No. 12.....		1.65 to 1.75
Nos. 13 and 14.....		1.70 to 1.80
Nos. 15 and 16.....		1.75 to 1.85
Nos. 17 to 21.....		1.80 to 1.90
Nos. 22 and 24.....		1.85 to 1.95
Nos. 25 and 26.....		1.90 to 2.00
No. 27.....		1.95 to 2.05
No. 28.....		2.00 to 2.10
No. 29.....		2.05 to 2.15
No. 30.....		2.15 to 2.25

Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11.....		2.50 to 2.65
No. 12.....		2.60 to 2.75
Nos. 13 and 14.....		2.60 to 2.75
Nos. 15 and 16.....		2.70 to 2.85
Nos. 17 to 21.....		2.85 to 3.00
Nos. 22 and 24.....		3.05 to 3.20
Nos. 25 and 26.....		3.20 to 3.35
No. 27.....		3.35 to 3.50
No. 28.....		3.50 to 3.65
No. 29.....		3.65 to 3.75

## Pittsburgh

PITTSBURGH, PA., Oct. 19, 1915.

The great activity in the steel trade continues and prices of finished iron and steel are steadily moving upward. In the week plates, shapes and bars have advanced \$1 per ton; the leading interest has put up Bessemer black sheets \$2; rivets are up \$3; heavy steel scrap and low phosphorus melting stock, fully 50c., and prompt furnace coke, 25c. The mills are congested with business and it is intimated that some of the recent advances in prices have been made to stave off the heavy demand if possible. The steel mills are sold up for the remainder of this year, consumers are covered for the same period, so that practically all the new orders now going on the books are for delivery in first quarter and first half. Some pig iron has been sold for delivery in first quarter and first half and the market is very strong. New inquiries are out for steel cars and it is said some of the leading roads are about to enter the market for a very large number of cars for delivery next year. There is a continued heavy demand for open-hearth rerolling and forging billets, on which prices are very strong. The chief trouble of consumers now is to get deliveries. On many lines of finished products the mills are back in shipments from four to ten weeks and the situation in this respect is getting worse. A car shortage is looming up, and when the grain commences to move from the West this will be intensified. The railroads are using every car that is in shape for traffic.

**Pig Iron.**—A local open-hearth steel interest has bought from Valley furnaces 10,000 tons of basic iron, mostly for delivery early in 1916 at the reported price of \$15 at furnace. The Union Switch & Signal Company is in the market for 5000 tons of foundry iron for first quarter, but it is believed part of this iron is for an identified interest. A radiator company at Johnstown, Pa., has bought upward of 4000 to 5000 tons of foundry iron from nearby furnaces that have a lower rate of freight than the Valley furnaces. A sale of 600 tons of Bessemer iron for November and December is reported at \$16, Valley furnace. We note sales of 6000 to 8000 tons of foundry iron for first quarter, most of it at \$15, Valley furnace. Prices are very firm. We quote standard Bessemer iron, \$16; basic, \$15; malleable Bessemer, \$14.75 to \$15; gray forge, \$13.75 to \$14, and No. 2 foundry, \$15, all at Valley furnace, the freight for delivery in the Cleveland or Pittsburgh district being 95c. per ton.

**Billets and Sheet Bars.**—There is an insistent heavy

demand for open-hearth and forging billets for shop purposes, and they are bringing very high prices. Ordinary carbon forging billets have sold at \$34.50 to \$35, Pittsburgh. For the first time in months some Bessemer and open-hearth steel is being offered for resale, one lot of 2000 tons of open-hearth billets being on the market. For delivery over remainder of the year we quote Bessemer billets, \$24.50; open-hearth billets, \$25; Bessemer sheet bars, \$25, and open-hearth sheet bars, \$25.50, maker's mill, Youngstown or Pittsburgh, prices of steel at the two points being practically the same. We quote forging billets at \$34.50 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 per ton extra. Axle billets are held at \$29 to \$30.

**Ferroalloys.**—Several cargoes of English 80 per cent ferromanganese have recently arrived at Baltimore, and the situation as to the supply looks better. A sale is reported of 600 tons of English 80 per cent, equal deliveries in the first six months of 1916, at \$100, Baltimore. Domestic 80 per cent is being offered at \$110, or slightly less, at furnace. We quote Bessemer ferrosilicon as follows: 10 per cent, \$21; 11 per cent, \$22; 12 per cent, \$23; 13 per cent, \$24.50; 14 per cent, \$26.50; 15 per cent, \$28.50, and 16 per cent, \$31. These prices are f.o.b. furnace, Ashland, Ky., Jackson, Ohio, or New Straitsville, Ohio, each of these points having a freight rate of \$2 per gross ton to Pittsburgh. These prices are for delivery over the remainder of this year only. For delivery in first quarter of 1916, 50c. per ton higher is quoted. We quote ferrotitanium at 8c. per pound in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots; ferrovanadium, \$2 to \$2.25 per pound of contained vanadium, prices depending somewhat on the size of the order.

**Steel Rails.**—No large orders for standard sections have been placed, but several leading railroads are said to be about ready to come in the market for their needs for 1916. The Edgar Thomson rail mill of the Carnegie Steel Company is running partly on war material, but has a large amount of business booked in standard section rails to be rolled later. The new demand for light rails continues active, the Carnegie Company having received new orders and specifications in the past week for about 3500 tons. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth stock, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows: 25 to 45-lb. sections, 1.34c.; 16 and 20 lb., 1.39c.; 12 and 14 lb., 1.44c.; 8 and 10 lb., 1.49c., in carload or larger lots, 5c. per 100 lb. advance being charged for less than carload lots.

**Structural Material.**—New inquiry is very active, and most of the fabricating shops are filled for the next two or three months or longer. The American Bridge Company has taken 500 tons additional for the Aluminum Ore Company at St. Louis, making a total of 1500 tons, and also 500 tons for a community house in this city. The McClintic-Marshall Company is said to have taken 5000 to 6000 tons additional for steel buildings for the Bethlehem Steel Company and 825 tons for new steel buildings for the Van Dorn Electric Tool Company, Cleveland, Ohio. The leading steel companies are now quoting beams and channels firm at 1.45c. at mill, and in some cases 1.50c. We therefore quote beams and channels up to 15 in. at 1.45c. to 1.50c., f.o.b. Pittsburgh, for delivery over the remainder of the year.

**Plates.**—The Pittsburgh Steamship Company, an identified interest of the Steel Corporation, has placed contracts for two ore boats. These will require from 10,000 to 12,000 tons each of plates and shapes, to be furnished by the Carnegie Steel Company. The Philadelphia & Reading has placed 1000 steel hoppers with the Pressed Steel Car Company, 1000 box cars with the American Car & Foundry Company and 500 gondolas with the Standard Steel Car Company. The Erie has placed 200 cars with the Pressed Steel Car Company. An inquiry is in the market from France for 1500 box cars. The two leading plate mills advanced prices on plates last week to 1.45c., minimum, and it is

aid that contracts have been placed for plates for delivery in first quarter and first half of next year at as high as 1.50c. at mill. We quote 1/4-in. and heavier plates at 1.45c. to 1.50c., f.o.b. mill.

**Carwheels.**—Some large inquiries for steel carwheels are expected in the market shortly. The two local makers are sold ahead for four months or more. Prices are very firm and likely to be higher. We quote 33-in. freight carwheels at \$17; 33-in. tender wheels, \$20; 36-in. passenger or tender wheels, \$24. These prices are based on a 10-in. diameter hub, 50c. extra being charged for an 11-in. diameter hub, all f.o.b. Pittsburgh.

**Sheets.**—Effective Monday, Oct. 18, the American Sheet & Tin Plate Company and several other makers advanced prices on Bessemer black sheets \$2 per ton, or from 2c. to 2.10c. for No. 28. It is believed that the other mills will shortly be quoting the higher price. The new demand for blue annealed and Bessemer black sheets is heavier than for some time, and the mills are filled up for weeks ahead. The new demand for galvanized sheets is slightly better and prices are firm. Operations among the sheet mills are at a heavier rate, the American Sheet & Tin Plate Company running this week to over 80 per cent. We quote No. 28 galvanized sheets at 3.50c. to 3.65c.; No. 28 Bessemer black sheets, 2c. to 2.10c.; Nos. 9 and 10 blue annealed, 1.40c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 and 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advance for small lots from store.

**Tin Plate.**—Mills report that consumers are specifying freely against their contracts for tin plate and in some cases have increased the quantity called for in their original contracts. Announcement of prices for 1916 delivery is daily expected. There is a good deal of export inquiry from South America, India and other foreign countries and considerable shipments are being made abroad. Most of the large mills are still operating close to 100 per cent of capacity, the American Sheet & Tin Plate Company running this week at about 91 per cent, operating five days. The new domestic demand is quiet and only for small lots. Prices are firm. We quote 14 x 20 coke plates for domestic trade at \$3.15 to \$3.25, f.o.b., Pittsburgh.

**Railroad Spikes.**—No large new inquiries are in the market, but several of the leading trunk lines which have lately placed large orders for steel rails are expected to come in the market for the spikes. Prices are very firm. We quote railroad spikes at \$1.60 for remainder of this year, \$1.65 for first quarter and \$1.70 for second quarter. Small railroad and boat spikes are quoted at \$1.70 for prompt delivery, \$1.75 for first quarter and \$1.80 for second quarter, per 100 lb.

**Cold-Rolled Strip Steel.**—Makers of cold-rolled strip steel state they have their product sold up for remainder of this year, and have entered a large amount of business for delivery in first quarter. Consumers who are not fully covered are paying slight premiums over the regular price for prompt deliveries. We quote cold-rolled steel, 1 1/2 in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., \$3.10 delivered. Extras, which are standard among all mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	\$0.25	\$0.10
0.089 to 0.075	\$0.05	0.25	0.15
0.075 to 0.065	0.20	0.25	0.15
0.065 to 0.051	0.35	0.40	0.25
0.051 to 0.035	0.45	0.40	0.40
0.035 to 0.020	0.55	0.40	0.50
0.020 to 0.017	0.85	0.50	1.10
0.017 to 0.015	1.25	0.50	1.10
0.015 to 0.013	1.95	0.50	1.25
0.013	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

**Skelp.**—The new demand is quiet, but prices continue firm. We quote grooved steel skelp at 1.40c. to 1.45c.; sheared steel skelp, 1.45c. to 1.50c.; grooved iron skelp, 1.80c. to 1.85c.; sheared iron skelp, 1.90c. to

1.95c., all delivered to consumers' mills in the Pittsburgh district.

**Wire Rods.**—There is an insistent heavy demand for wire rods from France, England and other countries, but local mills are not taking much of this business as they are sold up and cannot make deliveries. In fact, few rods have been sold in the open market by local makers for some months. Rods are scarce and for early delivery bring high prices. It is stated that \$32, Pittsburgh, is freely offered for rods for delivery this year.

**Wire Products.**—Advanced prices on all wire products go into effect on Thursday of this week. Some makers believe that by Jan. 1 nails will be up to \$1.90 at least and plain wire \$1.75. The wire mills are swamped with business, having their output sold for the next three or four months. The export demand for barb wire continues heavy, but local mills are turning it down, as they cannot handle it. The mills are very conservative about entering orders, not now desiring to have further obligations on their books that they can avoid, but at the same time are taking care of their customers as best they can. Prices effective Thursday are as follows: Wire nails, \$1.85; galvanized nails 1 in. and longer taking an advance over this price of \$1.75, and shorter than 1 in., \$2.25; plain annealed wire, \$1.70; galvanized barb wire and fence staples, \$2.70; painted barb wire, \$2; polished fence staples, \$2, all f.o.b. Pittsburgh, with freight added to point of delivery, terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 69 1/2 per cent off list for carload lots, 68 1/2 per cent for 1000-rod lots, and 67 1/2 per cent for small lots, f.o.b. Pittsburgh.

**Rivets.**—Local makers are overwhelmed with orders and are delayed very much in getting material, so that they are falling behind in shipments. The foreign demand is heavy, orders coming from China, India, Africa, Egypt and other countries. A sale of 900 to 1000 tons of rivets was recently made on the basis of \$1.90 for structural and \$2 for boiler rivets for delivery over remainder of this year, while 300 tons of the order went at \$2 for structural rivets and \$2.10 for boiler rivets for delivery in first quarter. Prices are higher and a further advance, due to the heavy demand and the high cost of raw material, is expected to be made within a week or two. We now quote buttonhead structural rivets at \$1.90 and conehead boiler rivets at \$2 in carload lots, per 100 lb., f.o.b., Pittsburgh, smaller lots bringing about 10c. advance, and for delivery the remainder of this year only.

**Hoops and Bands.**—Large contracts for both hoops and bands have been placed for delivery in first quarter and first half of next year without a flat price being given, but the price to be determined each month for the following month. Makers were not willing to sell so far ahead at a flat price and, in order to take care of customers, agreed to make contracts on this flexible basis. All the local makers of hoops and bands report very heavy business and have their output sold up for three or four months. Steel bands are up \$1 per ton. We quote hoops at 1.50c., and steel bands at 1.45c., f.o.b. Pittsburgh, with extras as per the steel bar card, for delivery over remainder of this year.

**Iron and Steel Bars.**—The leading makers have advanced prices on steel bars to 1.45c. for remainder of this year and first quarter of 1916. The new demand is enormously heavy and mills are turning away a great deal of business on which they cannot make deliveries. On some sizes of merchant steel bars the mills are back 10 weeks or more in shipments. Some good-sized contracts have been placed for first quarter at 1.45c., and some of the larger consumers seem willing to pay this price if assured they will get the bars. There is a continued heavy demand for steel rounds for shrapnel, but local mills are not in shape to take much of this business. The new demand for iron bars is only fair, but prices are firm. We now quote steel bars at 1.45c. for delivery over remainder of this year and for first quarter. Some contracts for steel bars have been made for first quarter at 1.50c. at mill. Common iron bars are 1.40c.; refined iron bars, 1.50c., and railroad test bars, 1.50c. to 1.55c., f.o.b. Pittsburgh.



**Shafting.**—Local makers are filled up for six months or more and one concern is quoting for first quarter 58 per cent off. Specifications are enormously heavy and the shafting makers cannot turn out their product fast enough to meet the wants of customers. Owing to the advance in prices of steel bars, higher prices on shafting are looked for. At this writing cold-rolled shafting is 60 per cent off in carloads and 55 per cent in less than carloads, f.o.b. Pittsburgh, but higher prices could be obtained for reasonably prompt deliveries.

**Merchant Steel.**—The mills are filled for three or four months and specifications are very heavy. Prices are strong and likely to be higher. On small lots we quote: Iron finished tire,  $\frac{1}{2}$  x  $1\frac{1}{2}$  in. and larger, 1.70c. base; under  $\frac{1}{2}$  x  $1\frac{1}{2}$  in., 1.85c.; planished tire, 1.90c.; channel tire,  $\frac{3}{4}$  to  $\frac{1}{2}$  and 1 in., 2.20c. to 2.30c.; 1 x  $\frac{1}{2}$  in. and larger, 2.30c.; toe calk, 2.30c. to 2.40c.; base; flat sleigh shoe, 2.05c.; concave and convex, 2.10c.; cutter shoe, tapered or bent, 2.60c. to 2.70c.; spring steel, 2.30c. to 2.40c.; machinery steel, smooth finish, 2.10c.

**Nuts and Bolts.**—The new demand is heavier than the makers can take care of and they are all back in deliveries from four to eight weeks. Costs of raw materials are steadily advancing and higher prices on nuts and bolts in the near future are likely. The export demand is heavy and regular shipments are being made to foreign countries. Discounts in effect at this writing are as follows: Common carriage bolts,  $\frac{3}{8}$  x 6 in., and shorter and smaller, rolled thread, 70, 10 & 10; cut thread, 75, 10 & 5; larger or longer, 75 & 5. Machine bolts with h. p. nuts,  $\frac{3}{8}$  x 4 in., and shorter and smaller, rolled thread, 75 & 5; cut thread, 75, 10 & 5; larger or longer, 75 & 10. Machine bolts with c. p. c. t. and r. nuts,  $\frac{3}{8}$  x 4 in., and shorter and smaller, 75, 10 & 2 $\frac{1}{2}$ ; larger or longer, 70, 10 & 7 $\frac{1}{2}$ . Blank bolts, 75 & 10. Bolt ends with h. p. nuts, 75 & 10; with c. p. c. and t. nuts, 70, 10 & 7 $\frac{1}{2}$ . Lag screws (cone or gimlet point), 80 & 15. Square nuts, h. p., tapped or blank, \$6 off list; hexagon, \$6.70 off; c. p. c. t. and r. nuts, tapped or blank, square, \$5.50 off; hexagon,  $\frac{3}{8}$  in. and larger, \$7 off; smaller, \$7.50 off; semi-finished nuts,  $\frac{3}{8}$  in. and larger, 85 & 10; smaller, 85, 10 & 10. Rivets, smaller than  $\frac{1}{2}$  in. in diameter, 80 & 10. All the foregoing prices are f.o.b. Pittsburgh, subject to an actual freight allowance not to exceed 20c. per 100 lb. on shipments of 300 lb. or more.

**Wrought Pipe.**—Makers report that the new demand for merchant pipe has picked up in the last week or ten days, and is heavier now than for some time. The United Natural Gas Company is contemplating laying a gas line from Lewis Run, near Bradford, Pa., to Niagara Falls, N. Y., but this may not be done before spring. Another gas line project is in the market that will take a very large amount of pipe, and if the franchise is granted promptly, a part of the line may be laid this fall. Discounts on black and galvanized iron and steel pipe are more firmly held than for some time, but are still being slightly shaded.

**Boiler Tubes.**—The new demand for locomotive and merchant tubes is active and the makers of boiler tubes report they are pretty well filled for the next two or three months. Discounts are reported to be quite firmly held.

**Coke.**—Prices on standard furnace coke have advanced sharply and it is now held at \$2 to \$2.10 per net ton at oven. A contract for standard furnace coke, involving about 12,000 tons per month, has been closed on the basis of \$2.25. It is stated that several merchant blast furnaces in the Shenango Valley are likely to go in blast in November, and inquiries are out from two or three of these for their coke. Negotiations are also on for foundry coke for shipment over first half and all of 1916. We quote standard makes of blast furnace coke for prompt shipment at \$2 to \$2.10; on contracts for first half and for all of 1916, \$2.25 to \$2.35; best grades of 72-hr. foundry coke, for prompt shipment, \$2.25 to \$2.35, and on contracts for first half, \$2.50 to \$2.60, all per net ton at ovens. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended

Oct. 9 as 417,724 net tons, an increase over the previous week of 20,135 tons, and the heaviest output in any one week for more than two years.

**Old Material.**—The local scrap market is looking better. A large consumer who has not been a buyer for some time, and, in fact, had held up shipments, is again in the market and has bought 10,000 tons or more of selected heavy steel scrap at prices ranging from \$14.50 to \$14.75 per gross ton delivered. The main activity is in heavy steel scrap and low phosphorus melting stock. There is no scrap pressing the market, dealers believing prices will be higher. We note sales of 500 and 1000 tons of low phosphorus melting stock at \$19.50 and 500 tons of No. 1 cast at \$12.75. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	\$14.50 to \$14.75
Compressed side and end sheet scrap	13.00 to 13.25
No. 1 foundry cast	12.75 to 13.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	12.25 to 12.50
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.25 to 14.50
No. 1 railroad malleable stock	12.25 to 12.50
Railroad grate bars	8.75 to 9.00
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	18.50 to 19.00
Steel car axles	16.00 to 16.50
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	11.50 to 11.75
No. 2 busheling scrap	8.00 to 8.25
Machine shop turnings	8.25 to 8.50
Old carwheels	13.00 to 13.25
Cast-iron borings	9.25 to 9.50
*Sheet bar crop ends	13.50 to 14.00
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.00 to 10.25
Heavy steel axle turnings	10.25 to 10.50
Heavy breakable cast scrap	12.50 to 12.75

\*Shipping point.

## Chicago

CHICAGO, ILL., Oct. 20, 1915.—(By Wire.)

An impending shortage of steel overshadows the market. The activity of buyers in providing for their expected needs, both immediate and for the first half, bears witness to the concern to which the volume of mill bookings and the rapidly advancing prices have given rise. The railroads, in particular, are buying rails, track fastenings and cars at an impressive rate. Meanwhile the mills have found, almost over night, that the in-pouring of contracts from their regular customers, added to the unceasing flow of orders for bars, rails and cars from abroad, has left but little first half capacity unsold, and where quotations on steel bars, shapes and plates have not been entirely withdrawn they have been advanced to 1.45c. and 1.50c., Pittsburgh. Conditions with respect to pig iron present a close parallel. With the prospect in this district of but one additional furnace available for blowing in, it is estimated that scarcely 200,000 tons of the possible production remains to be disposed of up to July 1. Sales of foundry and basic iron in the last ten days show an increased rather than a lessened rate of buying despite the extended period of activity, and prices last week were advanced from 50c. to \$1.50 per ton. Rail purchases negotiated by Western roads last week approximated 70,000 tons. Liberal contracts for track fastenings were also placed and with no concessions in prices. Inquiry and sales covering 11,000 cars, exclusive of foreign inquiry for approximately as many more, are reported. Inquiry for sheets, which has been meager and scattering, except for blue annealed, has been revived, a fact which will not retard the further advance in price already contemplated by the mills. With all the pressure for steel in all of its finished forms, the lack of demand for iron bars is conspicuous, and to this condition as well as to the apathy prevailing in the scrap market considerable interest attaches.

**Pig Iron.**—The movement toward higher prices and a showing of greater strength in the position of the furnaces continue steadily. The extent to which the strength of the market is due to the volume of sales

for future delivery, as against the obligations of the furnaces for the remainder of this year, is apparently somewhat variable. Unquestionably the foundries are providing for their expected needs upon a more liberal basis than would be required for their present operations. Sales in the past week have been heavy and have very clearly brought out the present strength of the market, particularly in the South. The large purchases of pipe iron, the practical withdrawal of the furnaces of the Tennessee Company and the large amount of iron still to be delivered on last half contracts all have contributed to this situation. A purchase of 5500 tons of Southern iron last week was practically on the basis of full market quotations. Subsequently the market moved up to \$13, Birmingham, for first quarter, an advance of 50c. Local foundries have in some instances so far sold up their capacity as to make imminent their withdrawal from the market, but the market still has iron to offer for fourth-quarter delivery. A purchase last week of about 40,000 tons of foundry iron by a radiator interest was distributed among furnaces at Chicago, Birmingham, the valleys and at Buffalo, the larger part going to the Buffalo furnaces. Considering the tonnage purchased by this interest, the prices paid represented little or no concessions from market quotations, though the furnace position was relatively less firm on prompt shipment than first-quarter iron. Prices for local foundry iron, with silicon 2 to 2.50 per cent, have been advanced to \$14.75, one maker asking \$15.50, and malleable to \$15.50. On the basis of recent heavy selling of basic in St. Louis territory, this iron is quotable at \$15. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$15.75 to \$16.25
Lake Superior charcoal, No. 1.....	16.25 to 16.75
Lake Superior charcoal, No. 6 and Scotch.....	16.75 to 17.25
Northern coke foundry, No. 1.....	15.25 to 15.75
Northern coke foundry, No. 2.....	14.75 to 15.25
Northern coke foundry, No. 3.....	14.50 to 14.75
Southern coke, No. 1 f'dry and 1 soft.....	16.50 to 17.00
Southern coke, No. 2 f'dry and 2 soft.....	16.00 to 16.50
Malleable Bessemer.....	15.50
Standard Bessemer.....	18.50
Basic.....	15.00
Low phosphorus.....	26.50 to 27.00
Silvery, 8 per cent.....	21.00 to 21.50
Silvery, 10 per cent.....	21.50 to 22.00

#### (By Mail)

**Rails and Track Supplies.**—The activity of the railroads in securing rails and track fastenings is an impressive feature of the market. The Great Northern, on its inquiry for 20,000 tons, has placed 10,000 tons at Chicago, and the remainder, including one portion of 5000 tons, at Eastern mills. The Illinois Central has ordered 20,000 tons to be rolled by the Alabama mill and expects to place a similar quantity in this market. The buying of track fastenings has become an important issue, while the prices paid are pointedly significant of prevailing conditions. An aggregate of more than 8000 tons of tie plates for three trunk lines was placed at Chicago at a price of \$30 at mill, which is an advance during the year of practically \$7 per ton, while 15,000 kegs of spikes were bought on the basis of 1.70c., Chicago. We quote standard railroad spikes at 1.65c. to 1.70c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, \$30, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.16c.; 16 to 20 lb., 1.21c.; 12 lb., 1.26c.; 8 lb., 1.31c.; angle bars, 1.50c., Chicago.

**Structural Material.**—Among the orders for car material placed last week was one for 12,000 tons, providing for 1000 cars. Inquiry still in the market includes 1000 hoppers for the Western Maryland, 200 flats for the Atlantic Coast Line, 450 gondolas for the Wheeling & Lake Erie, 1000 hoppers for the Baltimore & Ohio, 500 box cars, each, for the Minneapolis & St. Louis, the Chicago & Northwestern and the Missouri Pacific, 1000 box and 400 gondolas for the Louisville & Nashville, 1000 refrigerator and 500 box for the Illinois Central, which does not include 500 other cars for the Central of Georgia, 500 underframes for the Rock

Island and 1000 underframes for the Queen & Crescent. In addition there is the Russian inquiry for 10,000 cars. The amount of work already in the shops of Eastern carbuilders makes it appear likely that a large portion of the above construction will be done in Western plants. For building purposes, the demand for structural steel continues light. Contracts reported last week as placed included a freight house at Chicago for the Baltimore & Ohio Terminal Railway Company, 252 tons, to the American Bridge Company and 243 tons, taken by the Vierling Steel Company, for a Chicago Title & Trust Company warehouse, Chicago. Other contracts aggregating about 600 tons are also noted. The attitude of the mills in the matter of sales reflects with emphasis the shortage of steel. Eastern mills generally are quoting 1.50c., Pittsburgh, in this market. Contracting for the first quarter and first half has been exceedingly active, and, while the trade is complaining of the sharp advance in prices, customers appear to be eager to secure the protection in contracts for their requirements. At least one interest is understood to be practically sold up for the first half with contracts ranging in price from 1.40c. to 1.50c. Other interests which have consistently refrained from seeking business are still equally backward about assuming contracts, while one large mill has withdrawn all its quotations. The quotation of 1.40c., Pittsburgh, can still be said to obtain, but the mills that are quoting this price have very little steel to sell. We quote for Chicago delivery of structural steel from mill 1.589c. to 1.689c.

The volume of store business in structural steel is rapidly increasing, as the possibility of mill accommodation grows more limited. We quote for Chicago delivery of plain material from stock 2c.

**Plates.**—The variation in the price of plates, considered in the light of the mill situation, renders difficult any well defined estimate of the market. The larger mills, which have been accepting mixed specifications for shapes and plates, find themselves well sold up in their plate departments and are asking the same price for both plates and shapes. Other quotations, however, are current in the market, which would indicate that plate prices are still lagging \$1 per ton below the price of bars and shapes. We quote for Chicago delivery of plates from mill 1.539c. to 1.589c.

We quote for Chicago delivery of plates out of stock 2c.

**Sheets.**—Inquiry for sheets has increased in the past ten days in a marked degree, but, as yet, buying at the present level of prices which represents a substantial advance has been limited. For one-pass sheets a premium of \$2 per ton is being asked for next year's delivery over the immediate shipment price of 2c. With respect to blue-annealed sheets, the leading independent interest in this district is out of the market for the remainder of the year. We quote for Chicago delivery from mill, No. 10 blue annealed, 1.789c.; No. 28 black, 2.189c.; No. 28 galvanized, 3.789c.; heavy gages, 3.439c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed 2.20c.; No. 28 black, 2.55c.; No. 28 galvanized, 4.35c.

**Bars.**—Attempts to place ammunition bars for the French Government continue to result in a partially irresponsible and wholly unprecedented duplication of inquiry. It is probable that some 60,000 tons is available for placing. Ordinary emphasis is scarcely adequate to describe the condition of the mills with respect to their steel-bar operations. While in isolated instances there is still capacity available for the rolling of Bessemer bars, most of the mills are finding their trade ready to accept the steel which the mills can ship. In contrast, the demand for iron bars is much restricted, though the price is firm. We quote mill shipment, Chicago, as follows: Bar iron, 1.35c.; soft steel bars, 1.589c. to 1.689c.; hard steel bars, 1.35c.; shafting, in carloads, 63 per cent off; less than carloads 58 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 1.90c.; bar iron, 1.90c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes  $\frac{1}{2}$  in. and over and usual card extras for smaller sizes; shafting 52 per cent off.



**Rivets and Bolts.**—Manufacturers of nuts and bolts, facing very much higher prices for wire rods and bars, and with their plants well filled, are showing a decided disinclination to take on additional business at prices such as have been ruling for the past several months. The market is already moving upward to a higher level of quotations, although at the time there is no marked activity in the matter of contracts. This market is still trailing with respect to rivet prices. We quote as follows: Carriage bolts up to  $\frac{3}{4}$  x 6 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-5; machine bolts up to  $\frac{3}{4}$  x 4 in., rolled thread, with hot pressed square nuts, 80-15; cut thread, 80-10; larger sizes, 75-10; gimlet point coach screws, 80-15; hot pressed nuts, square, \$6 off per cwt.; hexagon, \$7 off per cwt. Structural rivets,  $\frac{3}{4}$  to  $1\frac{1}{4}$  in., 1.75c. to 1.85c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to  $\frac{3}{4}$  x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to  $\frac{3}{4}$  x 6 in., 75-10; larger sizes 70-15 off; hot pressed nuts, square, \$6, and hexagon, \$6.70 off per cwt.

**Wire Products.**—Specifications against old contracts are coming in freely, with little or no solicitation. Some of the mills are even showing a disposition to limit the tonnages which customers would be glad to take out. Quotations to jobbers, per 100 lb. (expected to be advanced this week), are as follows: Plain wire, No. 9 and coarser, base, \$1.789; wire nails, \$1.939; painted barb wire, \$2.089; galvanized barb wire, \$2.789; polished staples, \$2.089; galvanized staples, \$2.789, all Chicago.

**Cast-Iron Pipe.**—The United States Cast Iron Pipe & Foundry Company is the low bidder for the 1400 tons of pipe at Cincinnati, but, aside from this transaction there is little business in sight. For water pipe the season is about at a close. The advancing market has led to some premature inquiry for gas pipe, and at Detroit 3000 tons is understood to have been placed with the local shop. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$28; 6 in. and larger, \$26, with \$1 extra for Class A water pipe and gas pipe.

**Old Material.**—The apparently ample supply of scrap available and the corresponding lack of interest on the part of scrap users are in interesting contrast to the conditions prevailing in the finished steel market. For the rolling-mill grades, despite the limited operation of bar-iron mills, there has been some demand, but steel scrap prices are appreciably easier. There is inquiry for steel axle turnings, by way of contrast, but the supply is quite restricted. Slightly higher prices have been obtained for malleable scrap. Railroad offerings this week are negligible. An interesting development is the active collection of tungsten alloy tool steel scrap, which is reclaimed at attractive prices in view of the tungsten scarcity. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$13.50 to \$14.00
Relaying rails	19.50 to 20.50
Old carwheels	12.00 to 12.25
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft.	13.25 to 13.75
Heavy melting steel scrap	11.75 to 12.00
Frogs, switches and guards, cut apart	11.75 to 12.00
Shoveling steel	11.50 to 11.75
Steel axle turnings	9.50 to 10.00

Per Net Ton	
Iron angles and splice bars	\$14.00 to \$14.25
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	10.75 to 11.25
Iron car axles	15.50 to 16.00
Steel car axles	16.50 to 17.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.50 to 10.75
Cut forge	10.50 to 10.75
No. 1 busheling	9.25 to 9.75
No. 2 busheling	7.25 to 7.50
Pipes and flues	8.50 to 9.00
Steel knuckles and couplers	11.25 to 11.75
Steel springs	12.50 to 13.00
No. 1 boilers, cut to sheets and rings	8.50 to 8.75
Boiler punchings	10.75 to 11.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	7.00 to 7.25
Cast borings	6.50 to 7.00
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	8.75 to 9.00
Grate bars	8.50 to 8.75
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.25 to 9.75

## Philadelphia

PHILADELPHIA, PA., Oct. 19, 1915.

Except for added pressure on the steel mills, whose only problem is making sufficient steel and delivering it in the forms wanted, there is little change in the situation. The minimum quotation for plates, shapes and bars has been made 1.45c., Pittsburgh, or 1.609c., Philadelphia, but Eastern mills have in many cases been asking as much or more, and getting it. France is in the market for 40,000 to 50,000 tons of rails, and Russia wants about 90,000 tons additional to what she already has purchased. The utilization of some of the smaller mills for rolling rounds has caused the demand on 12-in. and 9-in. mills to attain abnormal proportions. Most billet makers are not anxious to sell, though inquiry, both domestic and foreign, is strong. Foundry pig iron is less active. Basic is in better demand and low phosphorus is active and higher. Ferromanganese is arriving in larger quantities. Old material is weaker in a quiet market.

**Pig Iron.**—Standard low phosphorus continues to advance under the stimulus of a heavy demand, and several thousand tons have been purchased at a figure between \$27 and \$28, delivered. Some brands are quoted at the last-named price. There are a number of inquiries from various foreign countries, including Japan. Canadian interests have continued to be good takers. Lebanon low phosphorus is now quoted at \$24, furnace, and approximately 10,000 tons was taken by consumers in the past week. The buying of 6000 tons of first quarter basic at \$17.50, delivered, by a New Jersey wire company, referred to a week ago, was augmented by the taking of as much, or more, for the first half, the reported price in the additional transaction being \$17.75 delivered. An eastern Pennsylvania steel company has bought 50,000 tons of basic from several makers for second quarter at \$17.50, delivered. Another took 1000 tons, 500 for December and 500 for January, the prices not being reported. For delivery this year \$17, delivered, can be done, though some producers are asking \$17.50. In a general way foundry irons are not as active as they were a few days ago, but a fair number of orders for small lots for delivery both this year and next continue to appear. Eastern Pennsylvania No. 2X can be had for the remainder of the year at \$16.29, delivered, and first quarter at \$17.29. The minimum quoted on No. 2X by another interest is \$16.85, delivered, shipments in this case to run into the first quarter. The William Cramp & Sons Ship & Engine Building Company has made inquiry for 1000 to 2000 tons of foundry grades. Inquiry also has been received from the Lynchburg Foundry Company, Lynchburg, Va., for a round lot of No. 3 and forge, a requirement which probably will be filled by Virginia furnaces. Virginia producers find that their deliveries are increasing and they are in a comfortable position. The arrival at Philadelphia of 59 tons of Swedish pig iron is reported. Quotations for standard brands, delivered in buyers' yards, shipment this year, range about as follows:

Eastern Penna., No. 2 X foundry	\$16.25 to \$16.75
Eastern Penna., No. 2 plain	16.00 to 16.50
Virginia, No. 2 X foundry	16.25 to 16.75
Virginia, No. 2 plain	16.00 to 16.25
Gray forge	15.25 to 15.50
Basic	17.00 to 17.50
Standard low phosphorus	26.50 to 27.50

**Iron Ore.**—Unsuccessful inquiry for low phosphorus ore has been made by at least three furnace operators who would like to make low phosphorus pig iron. None too plentiful at any time, the ore is now unusually scarce. In the week ended Oct. 16, 7524 tons of ore arrived at this port from Sweden.

**Ferroalloys.**—For a period back to a point preceding the beginning of the war, the quotations for 50 per cent ferrosilicon have shown no variation, but they have now been advanced \$14 per ton by one interest, making the new prices \$85 to \$87, Pittsburgh, according to quantity. A growing scarcity of the alloy is given as one reason for the advance, while another is the fact that higher prices have been obtainable abroad for some time. Larger arrivals of 80 per cent ferro-



manganese have tended to ease the market and there has been some talk of prices having been shaded from 50c. to \$1, but the general quotation is unchanged at \$100, seaboard, for futures, and \$110 for spot. It is estimated that 2500 tons, in various lots, arrived at Baltimore in the past few days, while 750 tons arrived at this port in the week ended Oct. 16. Most of the arrivals are for delivery against contracts.

**Bars.**—Business is largely confined to specifications against contracts, with mill representatives restricted in the matter of taking on new customers. While 1.45c., Pittsburgh, or 1.609c., Philadelphia, is the minimum where quotations can be obtained, a premium of at least \$1 per ton is often looked for. Mill conditions, rather than the enterprise of salesmen, now govern. Inquiry for large tonnages of steel rounds continue to come out, munitions makers being anxious to cover their 1916 requirements. The minimum quotation for rounds is 3c. Iron bars are firm at 1.559c., Philadelphia.

**Plates.**—A mill with which the manufacture of plates is a comparatively new departure quotes 1.45c., Pittsburgh, or 1.609c., Philadelphia, but other makers ask 1.659c., Philadelphia. The pressure on a leading mill is so great that making deliveries is a serious problem, and will be for some time, inasmuch as it is filled up to Jan. 1. The Lenoir Car Works have an inquiry out for 2000 tons of material, including plates, shapes, etc., for car construction.

**Structural Material.**—Mills of 12-in. and 9-in. capacity are overcrowded with work, but the pressure on the larger sizes is not so great; therefore deliveries of large-sized shapes can be made with much greater ease than can those of small or moderate sizes. The situation is partly due to the placing of the smaller equipment on bar work, thus creating more of a burden for those kept on regular work. The minimum quotation is 1.609c., Philadelphia, but in most cases \$1 to \$3 more per ton can be obtained. The project of the Lehigh & Wilkesbarre Coal Company to build a group of shop buildings at Ashley, Pa., has been revived, according to report. The City Transit Department, Philadelphia, to-day awarded the contract for the construction of the superstructure of the Frankford elevated line to the McClintic-Marshall Company whose bid was about \$1,705,000. The contract calls for about 25,000 tons of steel.

**Sheets.**—The demand for blue annealed continues good, and quotations are firm at 1.759c. to 1.859c., Philadelphia.

**Billets.**—A few days ago about 5000 tons of Western Bessemer billets were disposed of in this market, but the maker has no more to offer. Most of the makers are not anxious to sell open-hearth rerolling billets, the general quotation for which appears to be \$32, delivered. For forging billets \$38 and over is asked. The foreign inquiry is especially strong, while there is growing domestic inquiry for first and second half deliveries.

**Old Material.**—The easier feeling which usually follows a period of heavy buying is now being felt by the trade, and quotations are lower. The present attitude of the mills is to take bargains only. Heavy melting steel has sold in the last week at \$14.50. Up to a few days ago machine-shop turnings sold in large quantities at \$10.50, but they are now quoted at \$10 to \$10.25. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking in freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$14.50 to \$15.00
Old steel rails, rerolling.....	15.50 to 16.00
Low phos. heavy melting steel scrap.....	20.00 to 20.50
Old steel axles.....	19.50 to 20.50
Old iron axles.....	22.00 to 23.00
Old iron rails.....	17.50 to 18.00
Old carwheels.....	13.50 to 14.00
No. 1 railroad wrought.....	16.00 to 16.50
Wrought-iron pipe.....	13.00 to 13.50
No. 1 forge fire.....	11.00 to 11.50
Bundled sheets.....	11.00 to 11.50
No. 2 busheling.....	9.50 to 10.00
Machine shop turnings.....	10.00 to 10.25
Cast borings.....	10.00 to 10.50
No. 1 cast.....	14.00 to 14.50
Grate bars, railroad.....	10.50 to 11.00
Stove plate.....	10.50 to 11.00
Railroad malleable.....	10.50 to 11.00

**Rails.**—The Pennsylvania Steel Company has received an order from the Southern Pacific Railway for 1150 tons of girder rails, and from the Norfolk & Western for 4000 tons of 100-lb. rails. France is inquiring for 40,000 to 50,000 tons of 100-lb. rails, and Russia is in the market for about 90,000 tons of 67½-lb. rails, in addition to the 50,000 tons recently placed with the Lackawanna Steel Company.

**Coke.**—The market is strong. Prompt furnace is quoted at \$2 per net ton at oven; November and December at \$2.25, and first half at \$2.25 to \$2.35. Spot and contract foundry is quoted at \$2.30 to \$2.60. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

## Cincinnati

CINCINNATI, OHIO, Oct. 20, 1915.—(By Wire.)

**Pig Iron.**—A general advance of 50c. per ton has been made on all grades of Southern foundry iron, as well as on Northern foundry, malleable basic and the high silicon irons. The Southern price situation is especially strong, and for prompt shipment only a limited tonnage of No. 2 foundry can be obtained at \$12, Birmingham basis. The furnace interests are generally quoting \$12.50 for this year, and two producers have practically withdrawn from the market. First half quotations range all the way from \$12.50 to \$13.50, although no business is reported at the last named figure. Northern iron is held at \$15, Ironton, for last quarter delivery, with an advance of 25c. for first half. The Ohio silvery irons have also been marked up to \$18.50 at furnace for this year, \$19 for first quarter and \$19.50 for second quarter. Quite a number of small orders have been booked for shipment in the remainder of the year and in the first quarter. Inquiries for foundry iron from consumers in this territory show a decided increase over the previous weeks. Sales sheets also indicate that consumers have come into the market in earnest for a future supply. A round lot of Southern foundry was taken locally for first half shipment, while a number of melters have bought for the same delivery amounts ranging from 100 to 1000 tons. Inquiries from Indiana include one for 1500 tons of foundry iron, and the order will probably be divided between Southern and Northern producers. After a long quiet period malleable has suddenly become active, and inquiries now under negotiation include one from southern Ohio for 1000 tons, another from Michigan for 3000 to 5000 tons and several smaller requests for prices from users in this territory. Lake Superior charcoal also shows more life, 1000 tons having been bought by a Michigan firm for first half shipment and an inquiry is pending for 2000 tons in the same territory. The steel-making irons are also in demand, and nearby consumers are understood to be quietly negotiating for a future supply of basic, while there is an inquiry from the East for 10,000 tons for first half. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$15.40 to \$15.90
Southern coke, No. 2 f'dry and 2 soft.....	14.90 to 15.40
Southern coke, No. 3 foundry.....	14.40 to 14.90
Southern No. 4 foundry.....	13.90 to 14.40
Southern gray forge.....	13.40 to 13.90
Ohio silvery, 8 per cent silicon.....	19.76
Southern Ohio coke, No. 1.....	17.26 to 17.51
Southern Ohio coke, No. 2.....	16.26 to 16.51
Southern Ohio coke, No. 3.....	16.01 to 16.26
Southern Ohio malleable Bessemer.....	16.26 to 16.51
Basic, Northern.....	16.26 to 16.51
Lake Superior charcoal.....	16.70 to 17.70
Standard Southern carwheel.....	24.40 to 24.90

(By Mail)

**Coke.**—No straight-out inquiries have recently been issued by southern Ohio furnaces, but it is understood that two interests are in a receptive mood as to their future requirements. Wise County and Pocahontas oven operators are holding furnace coke around \$2.15 to \$2.25 per net ton at oven for prompt shipment and \$2.50 for contract business. Foundry coke in the two fields ranges from \$2.50 to \$2.75. Connellsville 48-hr. brands are quoted for spot shipment from \$1.85 to \$2 at oven, with 25c. to 35c. added for first half, while

foundry grades range from \$2.25 to \$2.65, with \$2.50 representing the average contract quotation. So far not much trouble has been experienced on account of car shortages, but some uneasiness is felt by both shippers and consumers, due to complaints of a growing scarcity of coal cars in certain sections which may affect other kinds of rolling stock at no distant date.

**Finished Material.**—There is a continued better demand for sheets, both black and galvanized. The mills and local warehouses are not willing to take contracts for shipment beyond Jan. 1. We quote mill prices on No. 28 galvanized sheets around 3.65c. to 3.75c., Pittsburgh basis, and No. 28 black sheets at 2.10c. The local store quotation on galvanized sheets ranges from 4.25c. to 4.35c. and No. 10 blue annealed sheets are unchanged at 2.20c. Steel bars from stock are quoted at 2c. and small structural shapes 2.10c. Mill agencies continue to receive many inquiries for shrapnel rounds, but the majority of these are from firms and individuals who are not in position to handle an order if it should be awarded them. However, the bona fide demand for this class of bars has not shown any diminution. Hoops and bands show a slight improvement. Reinforcing concrete rods are not in very good demand.

**Old Material.**—Prices on some grades of scrap iron are firming up, but no general advances may be noted. The consumption is increasing slightly, and the stove makers are probably among the last users to take heavier shipments on their old contracts. New business is about the same as has been reported for the past 30 days, with the possible exception of a better demand from the rolling mills. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio, and Cincinnati, and the maximum quotations are dealers' prices, f.o.b., at yards:

Per Gross Ton		
Bundled sheet scrap	.....	\$8.75 to \$9.25
Old iron rails	.....	12.25 to 12.75
Relaying rails, 50 lb. and up	.....	20.25 to 20.75
Rerolling steel rails	.....	11.00 to 11.50
Heavy melting steel scrap	.....	10.50 to 11.00
Steel rails for melting	.....	10.50 to 11.00
Per Net Ton		
No. 1 railroad wrought	.....	\$9.50 to \$10.00
Cast borings	.....	6.50 to 7.00
Steel turnings	.....	5.75 to 6.25
Railroad cast scrap	.....	10.25 to 10.75
No. 1 machinery cast scrap	.....	11.50 to 12.00
Burnt scrap	.....	7.50 to 8.00
Old iron axles	.....	15.25 to 15.75
Locomotive tires (smooth inside)	.....	9.75 to 10.25
Pipes and flues	.....	7.25 to 7.75
Malleable and steel scrap	.....	8.50 to 9.00
Railroad tank and sheet scrap	.....	6.50 to 7.00

## Cleveland

CLEVELAND, OHIO, Oct. 19, 1915.

**Iron Ore.**—No further inquiries for ore for 1915 shipment have come out and the shippers are devoting their attention to getting down ore already sold. Shipments are very heavy and boats could not be had for additional tonnage should there be a demand for more ore. The demand for boats for the grain trade continues heavy although grain rates are not quite as high as they were a few weeks ago, rates now ranging from 4½c. to 5c. We quote prices as follows, delivered to the lower lake ports: Old Range Bessemer, \$3.85; Mesaba Bessemer, \$3.45; Old Range Non-Bessemer, \$3, and Mesaba Non-Bessemer, \$2.85.

**Pig Iron.**—The market in this territory is active and prices on foundry grades are stiffening up. A Valley interest that has been booking orders at \$14.50 for No. 2 foundry is understood to have advanced its price to \$15, which is the ruling quotation by other producers. In Toledo the minimum price for No. 2 foundry has been advanced from \$14.50 to \$15.25. One Cleveland interest reports sales for the week outside this territory aggregating about 20,000 tons including one order for over 5000 tons of malleable iron. Southern iron prices are firmer, \$12, Birmingham, for No. 2 appearing to be the minimum quotation for this year. Some producers have advanced their prices from \$12.50 to \$13 for the first half, and as high as \$13.50 is being asked for the second quarter. A few small lot sales are reported at \$12.50 for the first quarter. Ohio silvery iron has been advanced to \$18.50 for 8 per cent

for this year, \$19 for the first quarter and \$19.50 for the second quarter. Bessemer ferrosilicon has been advanced to \$21.50 for 10 per cent for this year and \$22 for the first quarter. We quote delivery to Cleveland as follows:

Bessemer	.....	\$16.95
Basic	.....	15.80
Northern No. 2 foundry	.....	15.30
Southern No. 2 foundry	.....	\$16.00 to 16.50
Gray forge	.....	14.80
Jackson Co. silvery, 8 per cent silicon	20.12 to	20.62
Standard low phos., Valley furnace	24.50 to	25.00

**Coke.**—A Cleveland interest is in the market for 18,000 tons of furnace coke for delivery during the first half of next year and may decide to buy for the entire year. Foundry coke is inactive. Furnace coke is firm at about \$2 per net ton at oven for prompt shipment and \$2.25 for first half. Standard Connellsville Foundry coke is held at \$2.25 to \$2.50 for prompt shipment and \$2.50 to \$2.75 for contracts.

**Finished Iron and Steel.**—There is considerable inquiry for contracts but few mills are seeking to take on additional business. Some that have been most active in booking contracts are now well filled up for the first quarter. The advance in price on steel bars, plates and construction material to 1.45c., Pittsburgh, for contracts has become quite general and little if any tonnage is still available at 1.40c. Considerable business has been taken at 1.45c. For prompt shipment carload lots are being taken at 1.45c. to 1.50c. Three lake boats placed during the week will require about 13,800 tons of plates and structural material which will be furnished by the Carnegie Steel Company. Considerable tonnage will also be required for other boats ordered for the coast trade. In building lines, the only contract placed is for 700 tons for an addition to the Hollenden Hotel which went to John Eichleay, Jr., Pittsburgh. Bids have been taken for 300 tons for an armory in Akron. Forging billets are very scarce with prices as high at \$42 to \$43, Pittsburgh, being quoted. One quotation of \$45 at mill has been made for the first quarter. A Cleveland manufacturer is figuring on an order for high explosive shells which will require about 14,000 tons of billets. There is a heavy demand for forging steel bars. Automobile builders are having difficulty in covering for their increased requirements. Black and blue annealed sheets are in good demand and very firm. We quote black sheets at 2c. to 2.10c. for No. 28 and blue annealed at 1.60c. to 1.70c. for No. 10, and galvanized at 3.50c. and 3.65c. for No. 28. The demand for wire products is heavy and some second quarter contracts for plain wire are being taken at \$1 to \$2 advance over the \$1.60 price. Bar iron is quiet and firm at 1.50c., Cleveland. Warehouse prices are 2c. for steel bars and 2.10c. for billets and structural material.

**Bolts, Nuts and Rivets.**—The demand for bolts and nuts is active and prices are firm. Some orders for railroad track bolts for delivery at the convenience of the makers have been placed at \$2.50, or an advance of about 75c. over recent prices. Local makers quote rivets at 1.90c., Pittsburgh, for structural and 2c. for boiler rivets. Bolt and nut discounts are as follows: Common carriage bolts, ¾ x 6 in., smaller or shorter, rolled thread, 75, 10 and 10 per cent; cut thread, 75, 10 and 5; larger or longer, 70, 10 and 10; machine bolts with h.p. nuts, ¾ x 4 in., smaller or shorter, rolled thread, 75, 10, 10 and 5; cut thread, 75, 10 and 10 per cent; larger and longer, 75 and 5; coach and lag screws, 80 and 15; square h.p. nuts, blank or tapped, \$5.80 off the list; hexagon, h.p. blank or tapped, \$6.30 off; c.p.c. and t. square nuts, blank or tapped, \$5.30 off; hexagon, ¾ in. and larger, \$6.75 off; 9/16 in. and smaller, \$7.25 off; cold pressed semi-finished hexagon nuts, ¾ in. and larger, 85 off; smaller, 85 and 10.

**Old Material.**—The demand for steel-making scrap has again become quite active and the situation shows an improvement in that several mills that have been holding back on shipments are now taking scrap quite freely. The consumption is very heavy. A Cleveland mill purchased 5000 tons of heavy melting steel and other grades of scrap during the week. The American Shipbuilding Company sold 4000 tons in its Cleveland yard and 4000 tons at Lorain, mostly heavy steel and low phosphorus melting stock to a consumer, and 1200



ons at another yard to a Chicago dealer. This scrap brought out some high prices. The demand for turnings does not equal the production, which is very high. Prices on most grades are firm. Heavy melting steel is now quoted at \$13, as the minimum price in Cleveland. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Old steel rails	\$13.00 to \$13.50
Old iron rails	14.00 to 14.50
Steel car axles	19.00 to 20.00
Heavy melting steel	11.75 to 13.00
Old carwheels	11.75 to 12.00
Relaying rails, 50 lb. and over	10.00 to 10.25
Agricultural malleable	13.00 to 13.50
Railroad malleable	11.50 to 12.00
Steel axle turnings	11.50 to 12.00
Light handled sheet scrap	11.50 to 11.75
Per Net Ton	
Iron car axles	\$17.25 to \$17.75
Cast borings	7.00 to 7.25
Iron and steel turnings and drillings	6.00 to 6.25
No. 1 busheling	10.25 to 10.50
No. 1 railroad wrought	11.75 to 12.00
No. 1 cast	11.00 to 11.25
Railroad grate bars	9.00
Stove plate	9.25 to 9.50

## Buffalo

BUFFALO, N. Y., Oct. 19, 1915.

**Pig Iron.**—Inquiry continues in good volume, but furnaces are so well sold up for first quarter that orders are not sought. About 7000 tons all grades, principally for first quarter, were bought in the week. The ruling price for first quarter is now \$16 at furnace. There is evidence of a probable need of filling in orders before the end of the year. Some foundries are making preparations for expanding business. In certain instances Buffalo furnaces are marketing in fields that in ordinary times they do not reach. A steady demand for charcoal iron of all grades has developed and an early increase in price is indicated. We quote as follows f.o.b. furnace, Buffalo, for current and first quarter delivery:

Foundry of 4 to 5 per cent silicon	\$17.00
No. 1 foundry	\$16.25 to 16.50
No. 2 X foundry	15.50 to 16.00
No. 2 plain	15.50 to 15.75
No. 3 foundry	15.50
Gray forge	15.50
Malleable	15.50 to 16.00
Bessemer	16.00 to 16.50
Basic	16.50
Charcoal—regular brands and analysis	16.75 to 17.75
Charcoal—special brands and analysis	20.00 to 21.00

**Finished Iron and Steel.**—Specifications against contracts are being received in good volume, but there is not a great deal of new buying owing to the inability of mills to give nearby deliveries and their unwillingness to entertain offers for contracts for extended deliveries. In many instances mills are declining to quote on less than carload lot business on account of the impossibility of making reasonable deliveries. This is causing a considerable increase in the business going to warehouses. Domestic business, having no connection with war demand, is improving; and a good many manufacturing concerns, who have not until now felt any pressure in their business, are finding themselves short of material and embarrassed in getting it. Warehouse prices are the same as last week. The prices then quoted included delivery at consumers' plants, and prices from warehouses outside of the city of Buffalo are 5c. per 100 lb. lower at railroad freight stations and steamer docks. Consumers to do their own carting. The Alexander, Shumway & Utz Company, Rochester, wants several hundred tons of reinforcing bars for the Eastman Kodak addition, Rochester. It is understood that a Canadian shipbuilding company has been offered a contract for a canal size boat, involving about 1500 tons of shapes and plates, specifying completion and delivery of boat by midsummer. Prices for structural material are becoming much stronger. Bids go in this week for highway bridge over the New York State Barge Canal at Syracuse (Canal Contract No. 20) requiring 400 tons of steel; for New York Central Railroad bridge over the Barge Canal at Rochester about 500 tons, and also for State highway bridge at Lyons, N. Y., 200 tons. The Buffalo office of the American Bridge Company has taken the Bailey Avenue bridge, Buffalo, about 500 tons, and the

Charles F. Ernst & Sons Company, Buffalo, the foundry addition for the Titanium Alloy Mfg. Company, Niagara Falls, about 100 tons.

**Old Material.**—There is a brisk demand for heavy axle turnings and prices have advanced \$1 per ton. Heavy low phosphorus steel scrap is in good demand and prices are firm. There is still a scarcity of old iron and old steel axles, the supply being much below demand. Shipments in most lines are moving freely at the present prices; but mills are apparently not anxious to take on any more new business at any advance in prices, while dealers are inclined to hold for somewhat higher prices in some lines, particularly heavy melting steel. We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$13.00 to \$13.50
Low phosphorus steel	17.50 to 18.00
No. 1 railroad wrought scrap	12.50 to 13.00
No. 1 railroad and machinery cast	12.50 to 13.00
Old steel axles	19.00 to 19.50
Old iron axles	19.50 to 20.00
Old carwheels	12.75 to 13.25
Railroad malleable	12.50 to 13.00
Machine shop turnings	6.50 to 7.00
Heavy axle turnings	10.00 to 10.50
Clean cast borings	7.50 to 7.75
Old iron rails	15.50 to 16.00
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	8.50 to 9.00
Wrought pipe	10.50 to 11.00
Bundled sheet scrap	9.50 to 10.00
No. 1 busheling scrap	10.00 to 10.50
No. 2 busheling scrap	9.00 to 9.50
Bundled tin scrap	10.00

## Birmingham

BIRMINGHAM, ALA., Oct. 18, 1915.

**Pig Iron.**—The feature of the past week was the sale on Friday, Oct. 15, by the Tennessee Company of a small tonnage of No. 1 pig iron for 1916 delivery at \$14, which is on the basis of \$13.50 for No. 2. This is the first sale at that figure thus far recorded. About the middle of the week the leading foundry interest marked up spot iron to \$12.50 and 1916 delivery to \$13. Another maker advanced his product to \$13.50 for 1916. A manufacturer with four active stacks announces itself out of the market. Sales during the week amounted to largely over 50,000 tons. Stocks no longer cut any figure in this market. Some warrant iron is moving for export. The foundry iron output is being increased by the blowing in of a third Bessemer stack of the Tennessee Company. The fourth stack will be blown in before the month is out, and the company will then have all its plants in full operation, including coal mines, coking plants, steel mills, etc. The pig iron output of Alabama this month will be over 190,000 tons, and may be close to 200,000 tons. Steel mills are running at capacity, even in the rail department. That operations in this district are the largest on record is shown by the payrolls, which exceed any in its history. Only one iron maker is admittedly in the market with offerings of an appreciable quantity of spot. The remainder are fully sold up, one declaring that it has only special and analysis irons to offer. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$12.50 to \$13.00
No. 2 foundry and soft	12.00 to 12.50
No. 3	11.50 to 12.00
No. 4	11.25 to 11.75
Gray forge	11.00 to 11.50
Basic	12.00 to 12.50
Charcoal	21.00 to 21.50

**Cast-Iron Pipe.**—The water and gas pipe factories report a falling off in inquiry and orders alike, but they so far regard the lull as temporary. Active capacity has not been decreased. The sanitary pipe shops are on half time. Prices remain the same. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$22; 6-in. and upward, \$20, with \$1 added for gas pipe.

**Coal and Coke.**—Domestic coal has become quite active, but while steam coal grows slightly more active with the passing of each week, there is room for much improvement. Coke is in better demand. From the Pacific coast the inquiry for 1916 tonnage is becoming general and in many quarters there is a sug-



gestion that consumers apprehend a rise in price as the result of industrial activity. Furnace companies are using their own make, leaving the market open to the independents. We quote, per net ton, f.o.b. oven, as follows: Beehive furnace, \$2.75 to \$3; beehive foundry, \$3 to \$3.25, with the best makes at \$3.50; by-product furnace, \$2.50 to \$2.75; by-product foundry, \$2.75 to \$3.

**Old Material.**—Dealers find a market for all the scrap they can secure. Mills are taking all the available supply. A good deal of this is coming from broken up railroad cars. We quote, per gross ton, f.o.b. yards, as follows:

Old iron axles .....	\$13.50 to \$14.00
Old steel axles .....	13.00 to 13.50
Old iron rails .....	12.50 to 13.00
No. 1 railroad wrought .....	9.50 to 10.00
No. 2 railroad wrought .....	8.50 to 9.00
No. 1 country wrought .....	8.50 to 9.00
No. 1 machinery cast .....	9.50 to 10.00
No. 1 steel scrap .....	9.50 to 10.00
Tram carwheels .....	9.50 to 10.00
Stove plate .....	8.00 to 8.50

## St. Louis

ST. LOUIS, Mo., Oct. 18, 1915.

**Pig Iron.**—Sales of pig iron have been in small lots, from 500 tons down, but the aggregate has been satisfactory, considering the heavy sales of August and September. Prices are stiffening, for furnaces represented here are sold up for near deliveries and disinclined to make contracts. No. 2 Southern foundry, Birmingham basis, is \$12 to \$12.50 for last quarter, and for first quarter and first half the best figures are \$12.50 and \$13 respectively. Ohio iron is not in the running at prices quoted.

**Coke.**—Prices are firm. Local by-product coke continues to dominate the market by reason of its ability to more than meet outside competition.

**Old Material.**—A firmer tone is evident. Some items are sharply higher, especially material suitable for shipment East to munitions factories or for export direct, such as steel axles, which serve the purpose of billets. Re-rolling rails are also scarce and very firm, with relayers wanted at higher prices. Local demand is increasing, but it is still largely confined to special material, as the yards of the consumers are still well filled with scrap bought some months ago. Lists out include 500 tons from the St. Louis & San Francisco, 200 tons from the New Orleans & Northeastern, 800 tons from the Vandalia, 300 tons from the Wabash, 500 tons from the Chicago, Peoria & St. Louis. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails .....	\$11.75 to \$12.25
Old steel rails, re-rolling .....	12.50 to 13.00
Old steel rails, less than 3 ft. ....	12.50 to 13.00
Relaying rails, standard section, subject to inspection .....	21.00 to 23.00
Old carwheels .....	10.50 to 11.00
No. 1 railroad heavy melting steel scrap .....	11.50 to 12.00
Heavy shoveling steel .....	10.50 to 10.75
Frogs, switches and guards cut apart .....	11.50 to 12.00
Bundled sheet scrap .....	7.50 to 8.00

Per Net Ton	
Iron angle bars .....	\$11.75 to \$12.00
Steel angle bars .....	10.00 to 10.50
Iron car axles .....	16.25 to 16.50
Steel car axles .....	16.50 to 17.00
Wrought arch bars and transoms. ....	14.75 to 15.00
No. 1 railroad wrought .....	10.25 to 10.50
No. 2 railroad wrought .....	9.75 to 10.25
Railroad springs .....	11.25 to 11.75
Steel couplers and knuckles. ....	11.00 to 11.50
Locomotive tires, 42 in. and over, smooth inside .....	12.00 to 12.25
No. 1 dealers' forge .....	9.25 to 9.50
Mixed borings .....	6.00 to 6.50
No. 1 busheling .....	9.00 to 9.50
No. 1 boilers, cut to sheets and rings. ....	7.50 to 8.00
No. 1 railroad cast scrap. ....	10.50 to 10.75
Stove plate and light cast scrap. ....	8.50 to 8.75
Railroad malleable .....	8.75 to 9.00
Agricultural malleable .....	7.75 to 8.00
Pipes and flues .....	7.25 to 7.75
Railroad sheet and tank scrap. ....	7.00 to 7.25
Railroad grate bars .....	7.00 to 7.50
Machine shop turnings .....	7.00 to 7.50

**Finished Iron and Steel.**—Demand for material is growing and the aggregate of sales is equal to normal,

perhaps better. Fabricators are busy and have more work in sight than for a long time. Architects' boards are presenting a better appearance. Bars are in very good demand. Reinforcing bars are in especially good request. In standard section steel rails a sale of 500 tons to an Oklahoma road is the only one reported, but the Missouri, Kansas & Texas receiver is expected to enter the market before long. Light rails are in good demand, largely for export. Tank plates are quiet, but track fastenings are in fair request. Movement out of warehouse continues good. We quote for stock out of warehouse as follows: Soft steel bars, 1.95c.; iron bars, 1.90c.; structural material, 2.05c.; tank plates, 2.05c.; No. 10 blue annealed sheets, 2.25c.; No. 28 black sheets, cold rolled, one pass, 2.55c.; No. 28 galvanized sheets, black sheet gage, 4c.

## New York

NEW YORK, Oct. 20, 1915.

**Pig Iron.**—No large inquiries appear to be in the market and no general buying movement is in progress, but the volume of current business is steady. It comes from scattered foundrymen who had not covered their requirements for this year and first quarter, with an occasional order from consumers who had been supposed to have secured all the iron they would need until well along into 1916. Some sales agents, whose business has been quiet the past month or so, report an improvement in the demand from their trade this week. Altogether, the situation is favorable for selling interests, prices being firm with a tendency to advance. Southern iron, in fact, has moved up 50c. per ton. We quote at tidewater as follows for fourth quarter delivery: No. 2 foundry, \$16.50 to \$16.75; No. 2 X, \$16.25 to \$16.50; No. 2 plain, \$15.75 to \$16. Southern iron, \$17 to \$17.25 for No. 1 and \$16.75 to \$17 for No. 2 foundry and No. 2 soft.

**Ferroalloys.**—British licenses to ship ferromanganese are evidently more liberal than they have been for the past two months. It is probable that October receipts will approach 3500 to 4000 tons, which is perhaps twice the receipts in September. Receipts in November are expected to at least equal the October arrivals. A cargo of about 2500 tons reached Baltimore recently. Sales are being made of small lots, subject to the usual restrictions, at \$100, seaboard. Sales of domestic ferromanganese are not believed to be large, though some is being disposed of at anywhere from \$100 to \$115, depending on the conditions obtaining for each sale. Some sales of spot material, both British and domestic, at a shade under \$100, seaboard, are also rumored. The absence of any particular general anxiety by consumers is partly explained by the prevailing conviction among many that steel producers here will not be allowed to suffer as long as so much metal is going into war material. The spiegeleisen market is active, recent domestic inquiries totaling 2500 tons. Some of these have resulted in sales at \$28 to \$30, furnace, for delivery as far as into next year. The leading producer is out of the market until well into 1916, the material now available being the product of a western Pennsylvania maker. Ferrosilicon, 50 per cent, is very active, one representative here of a large producer declining to quote on business offered, being sold up for the balance of the year. The quotation of this producer is now \$85 to \$87, Pittsburgh, for delivery into 1916. It is understood that the large American producer has also advanced its price to the same figure.

**Structural Material.**—Railroad inquiries for bridge material are now sufficiently numerous to substantiate the impression last week that the growing scarcity of open tonnage of structural steel is realized in those quarters. No large quantities of shapes are obtainable this year, and it is not surprising that prices are higher. At least another mill has put its minimum at 1.50c., Pittsburgh, while the more general quotation of 1.45c., Pittsburgh, is in some cases nominal. Inquiry in general has improved and the widening interest shows that

structural mills will have full rolling schedules through the winter. Much of the bridge work must wait on foundations, and erection of considerable of the work shortly to be closed will probably occur in the spring months. This is true of building steelwork. The American Bridge Company has taken some of the recent railroad work, including 1200 tons for the Central of New Jersey and 500 tons for the Philadelphia & Reading, and it is reported to have been awarded 1200 tons for the Southern and is low on about 3000 tons for the Long Island. There are still over 11,000 tons before the market, putting the Maine Central, for a bridge at Wiscasset, Me., at 1000 tons; the union station at Macon, Ga., at 1500 tons; the 1916 requirements of the Delaware, Lackawanna & Western at 3500 tons, and the New York Central, for a barge canal bridge west of Syracuse, at 1500 tons. In loft building work there is a total of about 5000 tons pending, of a more or less active character, and in apartment houses about 7500 tons. The movement in public buildings and industrial establishments is holding up to the recent level. Some of the work closed includes: 500 tons for a loft, 58 West Fifty-seventh Street, 300 tons for a hospital on 196th Street and 250 tons for St. Bernard's school, West 138th Street, all three to the Hinkle Iron Company; 200 tons for a building on West Thirty-sixth Street to the American Bridge Company and 350 tons for the New Process Gear Corporation, Syracuse, to Smith & Caffrey, Syracuse, who have suffered a severe loss by fire of their fabrication shop. Levering & Garrigues Company is reported to have been awarded an office building at Albany, for the Kenney & Woodward Company, 900 tons, and Milliken Brothers, Inc., is said to be low for the Municipal Gas Company, Albany, 350 tons. A warehouse of the Ford Motor Company in Brooklyn, 350 tons, is in the market; a 12-story building, 700 tons, at Eighty-sixth Street and Amsterdam Avenue, and the Delaware public school, Syracuse, 550 tons. Other projects reported include 300 tons for the Avery Chemical Company, Lowell, Mass.; 400 tons for a warehouse in Cuba; 300 tons for the Waterbury Farrel Foundry & Machine Company, and 2000 tons for the Baldt Steel Company, Newcastle, Del. We quote mill shipments at 1.45c. to 1.50c., Pittsburgh, or 1.619c. to 1.669c., New York. For small lots from store we quote 2.10c. to 2.15c., New York.

**Plates.**—Such has been the demand elsewhere than in this market for shipbuilding, railroad cars and locomotives that deliveries are somewhat more extended and prices are higher. One maker is practically out of the market; another has nothing for shipment this year and is quoting 1.50c., Pittsburgh, as a minimum and the present minimum is 1.45c. The Philadelphia & Reading, after getting prices on 1000 hopper cars, placed 2500, 1000 to the Pressed Steel Car Company, 1000 to the American Car & Foundry Company and 500 to the Standard Steel Car Company, and it is expected that some of the other car inquiries for nominal amounts will be increased in the same way. Among such may be mentioned the Western Maryland, asking prices on 1000 hopper cars; the Central of New Jersey, which, in addition to 1000 hopper cars, has now added 1250 box cars, and the Baltimore & Ohio, which is asking on 1000 hopper cars, 500 box cars and 1000 underframes, indicating in the case of the last an intention to do some building on its own account. The Louisville & Nashville is in the market for 1400 underframes; the Norfolk & Western, it is understood, is to build 1000 gondolas in its own shops; the Lehigh Valley is expected in the market shortly for steel body box cars, and the Cincinnati, Indianapolis & Western (C. H. & D.) is to buy 850 cars. The Atlantic Coast Line has bought 200 flat cars from the American Car & Foundry Company. Two eastern lines are also expected soon to buy quietly about 15,000 cars between them. We quote mill shipments of plates at 1.45c. to 1.50c., Pittsburgh, or 1.619c. to 1.669c., New York. Plates from store are 2.10c. to 2.15c., New York.

**Iron and Steel Bars.**—The outstanding features are the difficulty of getting any deliveries this year on orders placed now and the refusal of companies to consider contracts for any period. Jobbers have not been buyers, so that the references made in this column

some months ago to their piling up stocks by heavy specifications on existing contracts indicate that they have taken care of themselves, and most, if not all urgent bar business as well as business in some other lines of finished material will have to come from the stores at warehouse prices. In fact, two cases are noted of large warehouse sales, one of 300 tons and the other of 150 tons. It seems clear that domestic consumers in 1916 will have difficulty in covering to anticipate advances and will have to buy at the market. In fact, quotations for the earliest possible delivery have already been made at 1.60c., Pittsburgh, and exporting at figures corresponding to 1.55c., Pittsburgh, has been done. For the large rounds for shells, prices range between 3c. and 3.25c., with some quotations reported at 3.50c. With the scarcity of steel bars for early delivery, bar iron is active, and more than 1.40c., Pittsburgh, has been paid. We quote mill shipments of steel bars nominally at 1.45c., Pittsburgh, or 1.569c., New York, and refined iron bars, 1.569c. to 1.619c., New York. Out of store in New York iron and steel bars are 2.05c. to 2.10c.

**Cast-Iron Pipe.**—Peapack, N. J., will open bids from contractors Oct. 26 on pipe-laying work requiring 700 tons of 6 to 8-in. pipe. Private buying continues in good volume. It is noteworthy that some of the shrewdest private buyers are now beginning to make contracts or put forth tentative inquiries for spring trade. Prices are strong. Carload lots of 6-in., class B and heavier, are quoted at \$26 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

**Old Material.**—The demand from steel companies and iron rolling mills continues stagnant. Inquiries are almost wholly lacking. About the only movement in rolling-mill stock is in axles for export. Such quantities are being taken that prices here are above parity with those in eastern Pennsylvania. Steel axles have been sold for export at about the same price as iron axles. Cast borings, wrought turnings and wrought pipe are lower. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

Old girder and T rails for melting	\$12.25 to \$12.50
Heavy melting steel scrap	12.25 to 12.50
Relaying rails	19.50 to 20.00
Rerolling rails	13.00 to 13.50
Iron car axles	22.00 to 22.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.00 to 14.50
Wrought-iron track scrap	13.00 to 13.50
No. 1 yard wrought, long	12.75 to 13.00
No. 1 yard wrought, short	12.25 to 12.50
Light iron (nominal)	4.00 to 4.25
Cast borings	7.50 to 7.75
Wrought turnings	7.50 to 7.75
Wrought pipe	10.50 to 10.75

Foundries are purchasing old material at a somewhat improved rate. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

Old car wheels	\$11.50 to \$12.00
No. 1 cast (machinery)	12.75 to 13.00
No. 2 cast (heavy)	11.75 to 12.00
Stove plate	9.75 to 10.00
Locomotive grate bars	9.00 to 9.50
Malleable cast (railroad)	10.00 to 10.50

The operations of only two plants in Cleveland, Ohio, are at present being interrupted by strikes of machinists to enforce demands for an 8-hr. day with 10-hr. pay. About 60 per cent of the employees of the Warner & Swasey Company are still out. The strike spread Oct. 15 to the plant of the Bardons & Oliver Company, where the employees struck for an 8-hr. day with 10-hr. pay and time and a half for overtime. The men have been working on a 9-hr. schedule, with time and a quarter for the ninth and additional hours. The company is understood to have offered time and a half for overtime. The F. B. Stearns Company, automobile maker, has placed its plant on a 49½-hr. schedule without reduction of pay, and time and a half for overtime. The strike at the plant of the Consolidated Mfg. Company, Toledo, Ohio, has been settled on an 8-hr. basis with an increase in pay.

The Morgan Engineering Company, Alliance, Ohio, has received an order from the Midvale Steel Company for a 200-ton ladle crane. It is said this will be the largest ladle crane ever built.

## British Market Advancing

### Possible Embargo on Steel Exports—American Tin Plate for Japan—Ferrosilicon Higher

(By Cable)

LONDON, ENGLAND, Oct. 20, 1915.

The foundry pig-iron market is firmer. Hematite iron is strong at 107s. 6d. Iron-ore prices are still rising together with freights. Furnaces in blast are 161, as compared with 162 at the same time a year ago. Stocks of pig iron in Connal's stores were 134,594 tons at the close of last week, as against 138,409 tons one week previous. Ferrosilicon, 50 per cent, is strong at £22. Semi-finished steel is firm and dearer, and it is feared that steel works may be monopolized by the government.

Unconfirmed rumors are to the effect that an embargo may be placed on exports of steel to safeguard government requirements. American offers of semi-finished steel have been withdrawn. Tin plates are strong at 18s. 6d. and 20,000 boxes for Japan have been placed in America. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 18s. 6d., against 17s. 9d. to 18s. last week.

Cleveland pig-iron warrants, 65s. 6d., against 64s. 9½d. a week ago.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 65s. 9d., compared with 65s. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £12.

Steel ship plates, Scotch, delivered local yards, £10.

Steel rails, export, f.o.b. works port, £8 17s. 6d.

Hematite pig iron, f.o.b. Tees, 107s. 6d., as compared with 102s. 6d. to 105s. a week ago.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 10s. and upward, against £7 5s. a week ago.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £11.

Steel bars, export, f.o.b. Clyde, £12 5s.

Ferromanganese, f.o.b., £20 15s.

Ferrosilicon, 50 per cent, c.i.f., £22, as compared with £19 10s. a week ago.

specifications for many kinds of war material permit the use of electrolytic instead of Lake. The exports this month total 12,187 tons.

**Tin.**—Since the last report a fair business has been done in futures, but the market has been characterized by the steadiness of buying rather than its volume. Inquiries are larger, but consumers have not yet taken hold. The best day of the week was on Monday when, on the surface, the market appeared to be dull, but some quiet business was carried on and about 200 tons changed hands, 40 or 50 tons of which involved spot. The uncertainty of the British export tax question has restrained activity and probably prevented a good movement. The quotation for spot deliveries yesterday was 33.25c., New York. The arrivals this month total 1700 tons, and there is afloat 4225 tons.

**Lead.**—The market has gained strength in the last week as a result of a heavy foreign demand, while ammunition makers in this country have been buyers also. Some of the export sales were made on a basis that enabled the sellers to realize 4.75c., f.o.b. New York. Russia and Canada, in particular, have been good purchasers. The only flaw in the present situation is the scarcity of ocean freight room, which has a tendency to restrict exports. The New York quotation was strong yesterday at 4.50c., and St. Louis was equally strong at 4.42½c. The exports this month total 1376 tons.

**Spelter.**—The market was quiet for several days and developed considerable pressure to sell, this being especially true of future deliveries in which consumers appear to be taking very little interest. Yesterday and to-day the market showed a little increased strength, which is attributed to the scarcity of prompt and October metal. Brass mill special is quoted at about 15.50c. Ordinary grades of prime Western can be had for first quarter delivery at from 11c. to 11.25c., New York. The exports this month total 3825 tons.

**Antimony.**—The blocking of the Panama Canal has been a continued influence in giving strength to the antimony market, although quite as strong a factor has been a good demand from war contractors in this country and Canada. Chinese and Japanese sold yesterday at 29c., duty paid, and are quoted up to 30c. Domestic antimony, refined in California, is finding wider use and is declared to be satisfactory in the manufacture of munitions. It commands the same price as Asiatic grades.

**Old Metals.**—With a fair demand, the market continues steady. Dealers' selling prices are continued as follows:

	Cents per lb.
Copper, heavy and crucible.....	16.75 to 17.00
Copper, heavy and wire.....	16.25 to 16.50
Copper, light and bottoms.....	14.50 to 15.00
Brass, heavy.....	11.75 to 12.00
Brass, light.....	10.00 to 10.25
Heavy machine composition.....	13.50 to 14.00
No. 1 yellow rod brass turnings.....	12.50 to 13.00
No. 1 red brass or composition turnings.....	12.00 to 13.00
Lead, heavy.....	4.25
Lead, tea.....	4.00
Zinc scrap.....	10.50 to 11.00

### Chicago

OCT. 18.—In copper there has been a steady but not brisk trading, and prices show no change. Tin quotations have fluctuated up and down the scale, but are approximately as a week ago. Lead quotations are firm and prices for antimony somewhat stronger. We quote: Casting copper, 17.50c.; Lake copper, 18c.; tin, carloads, 33.50c.; small lots, 36c.; lead, 4.45c.; spelter, nominally, 13.50c.; sheet zinc, nominally, 16c.; Cookson's antimony, 47.50c. to 50c.; other grades, 32c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c.; copper bottoms, 12.50c.; copper clips, 13.50c.; red brass, 11.25c.; yellow brass, 10c.; lead pipe, 3.75c.; zinc, 9c.; pewter, No. 1, 18c.; tinfoil, 25c.; block tin pipe, 28c.

### St. Louis

OCT. 18.—Non-ferrous metals have been quiet. Lead closed to-day at 4.40c. to 4.50c.; spelter, 13.25c. to 13.50c.; tin, 35c.; Lake copper, 18.50c.; electrolytic copper, 18.25c.; Asiatic antimony, 34c. In the Joplin ore market prices receded slightly on the lower grade ores, but the choicer grades were firm. The basis range

## Metal Market

NEW YORK, Oct. 20, 1915.

### The Week's Prices

Cents Per Pound for Early Delivery

Oct.	Copper, New York		Tin,	Lead		Spelter	
	Lake	Electro-lytic		New York	St. Louis	New York	St. Louis
13.....	18.00	18.00	32.65	4.50	4.42½	13.25	13.00
14.....	17.87½	18.00	32.75	4.50	4.42½	13.25	13.00
15.....	17.87½	18.00	32.80	4.50	4.42½	13.25	13.00
16.....	17.87½	18.00	.....	4.50	4.42½	13.25	13.00
18.....	17.75	17.75	33.00	4.50	4.42½	13.25	13.00
19.....	17.75	17.75	33.25	4.50	4.42½	13.50	13.25

Copper is lower under pressure to sell. Tin has advanced with steady but not heavy buying. Lead is firm principally because of export demand. Spelter is made a little firmer by the continued scarcity of the spot supply. Antimony is more active and higher.

### New York

**Copper.**—Throughout the week there has been a fair business for export though individual transactions were not notably large. The home consumption is dull, and apparently the combined demand is not sufficient to take care of production, for on Monday some of the producers lowered their quotation to 18c., full terms, while others brought their price down to 17.87½c., full terms. The metal can be had easily at 17.75c., cash, New York. Prime Lake is competing with electrolytic and can be had at the same price. All of the producers are anxious for business, and the general tone of the market is not regarded as satisfactory. It is reported from abroad that England is getting copper from Spain much more advantageously than she can buy here at the present rate of sterling exchange. The failure of the great war loan to make exchange rates advance is regarded with disappointment. Another influence which tends to ease the market is that



on zinc blende was \$75 to \$85 per ton, with the choicest selling at \$88 to \$89. Calamine ranged from \$40 to \$50, with premium ores \$55. Lead ore was dull at \$50 to \$52. Miscellaneous scrap metals are quoted as follows: Light brass, 6.50c.; heavy yellow brass, 8.50c.; heavy red brass and light copper, 10.50c.; heavy copper and copper wire, 12c.; lead, 3.50c.; tea lead, 3.50c.; zinc, 6.50c.

## Iron and Industrial Stocks

NEW YORK, Oct. 20, 1915.

The general drift of the stock market in the past few days has been lower because of the criticism directed against speculation in war shares. While this had an unfavorable influence on the general list, some stocks pursued an independent course and advanced to new high records. Among such stocks was Bethlehem Steel common, which sold up to 500, receding slightly. Another stock conspicuous in this respect was Steel common, which sold up to 87½, reaching the highest price at which it has sold since 1910. It will be remembered that in 1909 it touched 94%. On Wednesday of last week the New York Stock Exchange adopted a rule for the quotation of all stocks in dollars instead of quoting them on the basis of 100 for such a number of shares as might be required to reach that total. Thus Westinghouse Electric is now quoted at what would appear to be only half the price at which it was quoted prior to the adoption of the rule. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	42 - 45½	Pressed Stl., com.	70 - 73½
Allis-Chal., pref.	72½ - 75	Pressed Stl., pref.	104 - 105
Am. Can., com.	61½ - 66	Ry. Spring, com.	47 - 51½
Am. Can., pref.	106 - 106½	Republic, com.	52½ - 56½
Am. Car & Fdy., com.	82 - 89	Republic, pref.	103½ - 104½
Am. Car & Fdy., pref.	115 - 116½	Rumely Co., com.	4½ - 5½
Am. Loco., com.	66½ - 72	Rumely Co., pref.	9 - 10
Am. Loco., pref.	98½ - 99½	Sloss, com.	58½ - 63½
Am. Stl. Fdries., com.	62 - 74½	Sloss, pref.	93
Bald. Loco., com.	122½ - 135	Pipe, com.	24½ - 26½
Bald. Loco., pref.	107½ - 109	Pipe, pref.	45 - 46½
Beth. Steel, com.	449 - 500	U. S. Steel, com.	82½ - 87½
Beth. Steel, pref.	162 - 170	U. S. Steel, pref.	114½ - 115½
Case (J. I.), pref.	80	Va. I. C. & Coke	64½ - 70
Colorado Fuel...	54½ - 59½	West'gh'se Elec.	66½ - 72½
General Electric...	176 - 181½	Am. Ship, com.	35 - 38
Gr. No. Ore Cert.	47½ - 50½	Am. Ship, pref.	73 - 74½
Int. Harv. of N. J., com.	108½ - 113½	Chic. Pneu. Tool	84 - 88
Int. Harv. of N. J., pref.	117	Cambria Steel...	67 - 70½
Int. Harv. Corp., com.	70	Lake Sup. Corp.	9 - 9½
Int. Harv. Corp., pref.	100	Pa. Steel, pref.	90 - 93½
Lackawanna Stl.	82½ - 89½	Warwick	10½
Nat. En. & Stm., com.	29½ - 31½	Cruc. Steel, com.	90½ - 97
Nat. En. & Stm., pref.	91½	Cruc. Steel, pref.	109 - 110
Pitts. Steel, pref.	98 - 98½	Harb.-Walk. Ref., com.	50
		Harb.-Walk. Ref., pref.	98 - 98½
		La Belle Iron, com.	44½ - 52
		La Belle Iron, pref.	115

## Dividends

The J. G. Brill Company, regular quarterly, 1 per cent on the preferred stock, payable Nov. 1.  
The Willys-Overland Company, regular quarterly, 1½ per cent on the common stock, payable Nov. 1.  
The Taylor-Wharton Iron & Steel Company, regular quarterly, 1¼ per cent on the preferred stock, payable Oct. 23.

The West Milwaukee locomotive and car shops of the Chicago, Milwaukee & St. Paul Railway Company have been placed on the usual fall working schedule—the fall rush being over. The machine shop is now running eight instead of nine hours daily and the freight car division nine instead of ten hours. Both the working forces and the schedules are greater than a year ago.

Salisbury & Nightingale, iron and steel merchants, Providence, R. I., announce that the copartnership heretofore existing under that name was dissolved by the death of Edgar W. Salisbury, Sept. 29. The business of the firm will be conducted by Horatio R. Nightingale, Charles K. Baker and Ernest F. Salisbury, under the style of Nightingale, Baker & Salisbury.

## Aluminum Demand and Prices

Aluminum is advancing on the most sensational rise it ever had,—60c. per pound was paid last week for the 98-99 per cent metal. Two months ago it was as low as 30c. per pound and about the same price as copper several months ago. The cause is a diminishing supply in the face of a very heavily increasing demand. Before the war aluminum was imported from England and France; it is now embargoed by those nations. Our imports have fallen and our exports have increased as a result. The following table from the latest official Government reports will illustrate this:

	Exports		Imports	
	Pounds	Value	Pounds	Value
July, 1915	22,022	\$4,017	711,725	\$126,925
July, 1914	13,825	2,162	1,418,003	243,940
Seven months ended				
July, 1915	40,102	7,505	5,842,129	999,266
Seven months ended				
July, 1914	18,939	3,146	9,087,575	1,499,377
Seven months ended				
July, 1913			17,260,222	2,901,178

Imports are one-third less than two years ago while exports are more than double last year. War orders have been largely responsible for this increased demand—army canteens, time fuses, etc. The automobile demand is of extraordinary proportions. The average New York price of the 98-99 per cent metal in 1914 was 18.59½c. per pound, and 23.63c. and 22.52c. per pound in 1913 and 1912, respectively.

## Prices on Steel Chain Advanced

Makers of steel chain have advance prices and are now quoting in large lots as follows:

Proof Coil Chain—3/16-in., \$7.15; ¼-in., \$4.60; 5/16-in., \$3.60; ¾-in., \$3.05; 7/16-in., \$2.90; ½ and 9/16-in., \$2.75; ⅝ and 11/16-in., \$2.65; ¾ and 13/16-in., \$2.55; ⅞ and 15/16-in., \$2.45; 1-in., \$2.35; 1 1/16 and 1¼-in., \$2.45. Extras for BB quality are as follows: 3/16 and ¼-in., \$1; 5/16-in. and larger, 75c. Extras for BBB quality are as follows: 3/16 and ¼-in., \$1.50; 5/16-in. and larger, \$1.25.

The above prices are for prompt acceptance, and for delivery over remainder of this year only.

The Pittsburgh Steamship Company has placed contracts with Lake shipbuilders for two 12,000-ton boats, these being the first orders booked for bulk freighters for Lake trade for 1916 delivery. One will be built at the Lorain yard of the American Shipbuilding Company and the other at the Ecorse yard of the Great Lakes Engineering Works. The new boats will be of the Isherwood type, 600 ft. over all, 580 ft. keel, 60 ft. beam and 32 ft. deep. A feature of the dimensions is that the boats will be 2 ft. wider than has been the usual practice in Lake construction. The Great Lakes Engineering Works have also taken an order for a steel freighter of a special type for the Atlantic coast trade for delivery May 1 next year. This will be of the Welland Canal size.

The latest report of the county inspector of mines for St. Louis County, Minnesota, within which most of the mines of the Mesaba and Vermillion ranges are located, presents a striking contrast in the number of accidents in the year ended June 30, 1915, and in a like period ten years ago. Ten years ago the number of fatalities per 1000 men was 7.48, whereas the number was but 2.09 last year. There were but twenty-four fatal and twenty-eight serious but non-fatal accidents with a total of 11,436 men employed and a production of 19,931,274 tons of ore. Credit for this excellent showing is given almost entirely to safety first regulations and provisions for first aid.

Spelter imports into Great Britain in 1914 were 115,859 gross tons; in 1913 they were 145,004 tons with 137,268 tons in 1912. The imports from the United States were 35,068 tons in 1914 against only 4670 tons and 4915 tons in 1913 and 1912, respectively, or nearly eight times greater in 1914. Spelter received from Germany and Belgium was only 60,000 tons in 1914 against 117,000 and 111,000 tons in 1913 and 1912, respectively.

# Influence of Nitrogen on Iron and Steel

## How the Various Elements Affect Its Introduction—Nitrogen in Ferrosilicon—Bessemer Scrap in Open-Hearth Steel—Effect of Temperature

"The Occurrence and Influence of Nitrogen on Iron and Steel" is the subject of an important paper presented at the autumn meeting of the Iron and Steel Institute in London, England, Sept. 23, 1915, by Prof. N. Tschischewski of Tomsk, Russia. In introducing the subject the author said:

The injurious influence of nitrogen on the mechanical properties of iron is now firmly proved. As shown by its position in Mendelejeff's periodical system, it would necessarily be an injurious impurity. In this system it occurs in Group V., above phosphorus, and in the second line between carbon and oxygen. The presence of oxygen up to 1 per cent renders iron unmal-leable, while phosphorus up to 0.1 per cent causes cold shortness.

If nitrogen in such quantities as usually found in steel can be in a high degree injurious, it is necessary to ascertain the amount of nitrogen constantly present in all manufactured steel products. It is also necessary to discover a method for the diminution of the amount of nitrogen in the product, either by modifying the process or the composition of the fluxes.

The earlier part of the paper is occupied with a consideration of methods of estimating nitrogen and with an investigation of the influence of carbon, manganese, silicon, and aluminum on the combination of nitrogen with, or its presence in, iron and steel.

### ALUMINUM ADDITIONS AND NITROGEN

In dealing with aluminum, Professor Tschischewski said:

The use of aluminum in the manufacture of steel is usually limited to adding it to the steel with the object of deoxidizing the molten metal. One of the reasons for the decrease in the evolution of gases is the combination of aluminum with the nitrogen, present in steel and evolved by cooling. The ratio of nitrogen to the total amount of evolved gases, according to many authors, is 14 per cent and sometimes more. Investigations prove that the aluminum, combining with the gaseous nitrogen, forms a very stable compound. The reaction begins at about 400 deg., and its velocity increases gradually to a temperature of 1350 deg.

Two products are formed: the first is represented by the gray-colored powder, and the second is a black powder corresponding, as was proved by analysis, with the formula  $AlN$ . This compound does not dissociate at a temperature of 1750 deg. The aluminum, dissolving in molten iron, combines with nitrogen, which is undoubtedly dissolved in molten iron. The question arises: Is the aluminum nitride soluble in iron and to what extent? Experiments prove that aluminum, added to molten steel, combines with nitrogen, and forms with it a hard solution of aluminum nitride without evolving any nitrogen.

If the ratio of gas which evolves from steel be calculated on the weight of the ingot, it can be proved that the aluminum must hold in itself a considerable amount of nitrogen, and by reducing blow holes, it can produce bad quality of metal.

### NITROGEN AND THE MECHANICAL PROPERTIES

Dealing finally with the effect of nitrogen on the mechanical properties of steel, the author described a number of tests carried out with thin wire saturated with nitrogen to a greater or less extent. Commercial iron and steel contain much less nitrogen than the material used in the experiments, the results of which, however, show the considerable

influence of minute quantities of nitrogen. With increase in the amount of nitrogen the ultimate stress increases, but the elongation decreases as well as the elastic limit. The presence of nitrogen, by increasing the hardness and reducing elasticity, causes cold-shortness.

Bessemer steel generally contains five times as much nitrogen as that made by the open-hearth process.

### The Discussion

The paper was declared a very important one by several prominent British metallurgists and scientists and the discussion of it was quite extended. Some of the important points brought out were as follows:

Dr. W. H. Hatfield regarded this paper as one of the best on this subject published in a long time. In his opinion more importance had been attached to the influence of nitrogen than should have been. The value of the paper seemed to him to lie in the fact that the author furnishes a lot of valuable experimental data showing the conditions under which nitrogen can be introduced into iron. They were indebted to the author for giving the nitrogen content of commercial steels.

### NITROGEN IN FERROSILICON

One thought had occurred to him which seemed quite an interesting one. It bore upon the assumed detrimental influence of nitrogen, but in this connection he was speaking not of the quality of the steel, or of the mechanical standard, but of the soundness standard. There was a paragraph which stated that: "Owing to the large amount of nitrogen present in ferrosilicon, ferrosilicon additions to molten steel should be made with care, as the nitrogen can enter into solution with the iron, and may be the cause of bad quality in the resulting metal." Some years ago, Professor McWilliam and himself, were working on the elimination of silicon in the acid open-hearth, and they published a paper on the subject before the Institute. Apart altogether from the direct subject upon which they were working, which was the introduction of the silicon, he at the same time was making a number of observations upon the accuracy of the Brinell tenacity quotient, that is, different values were given to silicon, manganese and aluminum, and the sum total of the three figures obtained should be a certain figure to give a certain result in soundness. If this figure was below the certain amount, there would be blow holes and if it was higher, there would be a piped steel.

One interesting feature which came out, but which could not be explained at the time the paper was read, was that if they worked acid open-hearth with free acid slag, and introduced quite a lot of silicon into the steel, that silicon seemed to be much more effective in producing sound steel than ferrosilicon added to the ladle. That was quite an interesting point, and considering this with the suggestion of the author that the ferrosilicon added nitrogen to the steel, one might say that the efficiency of the silicon as a blow-hole preventative would be diminished probably by the nitrogen present in the ferrosilicon.

J. P. E. C. Stromeyer said that, illustrating the fact that there was a difference between the two nitrogens, the one introduced by ammonia and that found in brittle plates, according to the experiments in the paper, 1 per cent of nitrogen affected the tenacity to the extent of 75 tons per square inch between 0 and 0.13 per cent whereas in the brittle steels that had come to him, the tenacity seemed to increase at rate of from 250 to 300

ons. That was a very big difference and was one of his reasons for thinking that the two forms in which the nitrogen existed in steel were not the same.

#### INTRODUCTION OF NITROGEN

Dr. J. E. Stead thought the Institute was very greatly indebted to the author for having presented so many scientific facts. The paper added greatly to our knowledge by proving the compounds  $Mn_3$ ,  $Mn_3N_2$  and  $AlN$ . The author had also shown that while iron would not combine directly with nitrogen at any temperature, yet the astonishing thing was that all Bessemer steels were more or less high in nitrogen. It was nitrogen in the air that was blown through in the converter. There was no nitrogen except in very small quantities in open-hearth steel, which was not subjected to a current of free nitrogen. This did not prove conclusively that nitrogen combined with iron when it was blown through the metal. In all metals blown in the converters there was manganese and silicon—not very often aluminum—and it was quite possible that the reactions might take place between these elements and the free nitrogen forming these nitrides. Thus although they might be decomposed afterwards, the residue of the nitrogen remained in combination with the iron. The only way to find out whether a steel was Bessemer or a good open-hearth steel was by a nitrogen determination, a very important consideration.

Another point in regard to the author's experiments was that they were only laboratory trials, and not to be compared with practical trials. He (Dr. Stead) had some soft steel wire that had been exposed to the action of ammonia gas at 650 deg. C. for 5 hr. An examination of this showed that one end was soft, while the author's was as brittle as glass, but in the center there was a nucleus or practically pure iron. When the wire was expanded or submitted to tension, it was obvious that it was the brittle part which would not expand. It broke down causing a fracture throughout the whole piece of wire. Therefore experiments on a piece of wire of this kind did not help very much, and we must not conclude that because wire nitrified by ammonia was very brittle, therefore steel with a very small quantity of nitrogen would be brittle also. The wires used by the author were 0.024 in. in diameter, and there could be little doubt that the outer layers, as proved by the author, contained much more nitrogen than was present in the interior. The results were useful in showing that, in proportion as the nitrogen rises, the ductility falls. Taking elongation in each case at 15 kg. and averaging the results for each percentage of nitrogen, the following figures were obtained:

Percentage of nitrogen.	0.0038	0.027	0.037	0.067	0.077	0.118
Elongation, per cent. . . .	12.2	5.1	0.56	0.41	0.34	0.23

He had met with many steels containing more than 0.027 per cent of nitrogen, in which elongation was 30 per cent and this showed how dangerous it was to conclude from experiments of this kind that nitrogen in that quantity was really as harmless as the author alleged.

#### OPEN-HEARTH STEEL AND BESSEMER SCRAP

It had been alleged by Mr. Stromeyer at the May meeting of the Institute that any open-hearth steel which "smelt" a little bit of Bessemer steel scrap was unfit for boiler plates. That probably was an exaggeration, but the argument was that if Bessemer scrap was used in an open-hearth process, that steel was not so good as if other kinds of scrap were used. In other words Mr. Stromeyer stated that once nitrogen was in the steel, it remained there and did harm. That was one of the points which a committee of this Institute has set about to determine. Very elaborate experiments were made upon basic open-hearth steel, in which a very large porportion of basic iron scrap was mixed with basic iron, and converted into steel. Practically all the excess of nitrogen introduced by the metal was eliminated during the process. Mr. Saniter in Sheffield made similar experiments in basic open-hearth with nearly 50 per cent of scrap, and the same thing occurred. The nitrogen was eliminated, so that he thought we could for the present, subject to further

experiments, say that even if Bessemer steel was the black beast it was painted, it did not continue to be a black beast in open-hearth steel.

#### TEMPERATURE AND NITROGEN ABSORPTION

At present there was a very long distance between the percentages of nitrogen which it was thought were harmful, and it would require very careful research to determine accurately the effect of a small amount of nitrogen. It had always been understood that in the Bessemer converter the quenching of nitrogen remaining depended somewhat upon the amount of manganese that remained. The author stated that in heating up to 1600 deg., all the nitrogen disappeared. That suggested a series of experiments. Tempering might have an important effect. If a Bessemer blow was finished at a low temperature so that it would just pour, it was quite possible that one might have more nitrogen in that blast than if it were heated to a very high temperature before that. Then again Swedish Bessemer, in which there was very little manganese in the pig, had considerably less nitrogen than English Bessemer. Therefore it pointed to these elements as being catches of nitrogen during the blow. Another point of interest was that when Bessemer steel was melted practically no nitrogen was eliminated. This was at a relatively low temperature so that it all pointed in the direction that temperature had something to do with the amount of nitrogen that remained in the finished product.

#### NITROGEN DECLARED HARMLESS

Sir Robert Hadfield testified that while they were all indebted to the Russian professor, he did not think he had proved in any single instance that the effect of nitrogen was what he had claimed. In fact he did not believe that he had fully proved the presence of nitrogen in steel at all. That was a very strong statement to make, but he did not see that nitrogen had any deleterious influence. This could be proved by an examination of the magnificent Swedish Bessemer steel. He had subjected this to passing air through it and it was not found that its quality was in any way impaired. An example was to be found in a comparison of caps for armor piercing projectiles. There could not be a more severe test, for when the irresistible projectile met the undefended plate, an enormous amount of energy must be expended, and the cap must extend to almost the diameter of the projectile itself.

Notwithstanding this severe test he had never discovered any deleterious influence of the nitrogen in Swedish Bessemer steel in any way. If one started with an unsound steel, bad results would be obtained. There must be sound steel to start with. He strongly differed from the author who said that aluminum was of no use. What would we do without aluminum and silicon?

It was quite true that in America great attention had been paid to the use of ferrotitanium for increasing soundness and taking away the so-called nitrogen present. It was assumed to form a carbide to which Dr. Stead had so often referred, but he had never yet had it definitely proved to him that the so-called nitrogen present had any influence. That which did have a great influence was the presence of blow holes, segregation and piping.

When the author publishes the paper in the proceedings of the Institute he would ask him if he could not see his way to withdraw his tremendously strong statement with regard to the damage by aluminum and silicon. We were just getting used to the use of these elements to solidify our steel, and obtain better material, and he did not want the rising generation of metallurgists to think that metallurgists were now going to throw over these useful adjuncts.

Dr. Stead suggested that they were all looking for the truth, and if Sir Robert Hadfield was right, which they all sincerely hoped he was, it would be well to establish that fact, but if Mr. Stromeyer had some foundation for his statement then we ought to know it. Whichever way the research went, it was going to be to the benefit of metallurgy of steel and iron, and of the world, because if we found that nitrogen was harmful, then it was up to us to find the best way to elimi-



nate it or prevent it being present. If on the other hand it was found not to be harmful at all we could go on and be happy ever after.

#### BESSEMER AS GOOD AS OPEN-HEARTH

E. H. Saniter thought the research a very systematic one on the effect of nitrogen from the laboratory point of view, but the paper failed in that it had no reference to steel as manufactured. Nevertheless it was useful to investigate these matters and although he rather shared the views of Sir Robert Hadfield, he felt we might continue to investigate. He was connected with acid Bessemer steel and acid basic open-hearth steel in the same works, and his opinion was that but for the inherent irregularities in the Bessemer process due to the nature of that process itself, a well made Bessemer heat would give just as good a steel as open-hearth steel, but owing to the rapid method in which the Bessemer process had to be carried out, it was impossible to have the accurate regularity obtained in the open-hearth process.

Mr. Saniter suggested to the chemists particularly that if there was to be a great deal of investigation in the matter of nitrogen, the methods used for estimating nitrogen should be carefully gone in to. In making nitrogen investigations in different laboratories he had sometimes found 100 per cent difference in the amount estimated. Therefore if they were going to have nitrogen investigations from nothing to 0.013 per cent the method of analysis must be investigated.

The president, Arthur Cooper, in proposing a vote of thanks to the author, said that in speaking for himself he looked upon nitrogen as an innocent vehicle for taking in oxygen, which was certainly the most comfortable way of regarding nitrogen. At any rate there appeared to be a difference among metallurgists and he would remind them of the old adage, that when thieves fall out, honest men get their dues. He would alter this to say that when metallurgists fall out, honest steel makers get their dues.

#### Government Shop Management

An interesting and suggestive discussion of scientific shop management in Government establishments is contained in a paper prepared for presentation before the Philadelphia School of Commerce and Accounts, with the special permission of the Secretary of War, by Gen. William Crozier, Chief of Ordnance, U. S. Army. The author describes in detail the installation of the so-called Taylor system at Watertown and the development of scientific management at that arsenal and elsewhere in the ordnance service, recounts the efforts made by leaders of organized labor to oust the system and the results of the investigations undertaken to determine the real sentiments of the workmen toward the time-study and premium systems, and the means employed by the labor leaders to induce Congress to believe that the operatives are opposed to scientific management.

In summarizing the conclusions he has reached as the result of more than six years devoted to the study of scientific shop management, General Crozier says:

"To sum up, there are two objections to scientific management which seem to be inherent in human nature, and which must be endured until a remedy can be found for them. These are, a certain inequality of opportunity, and the requirement that sums paid shall be definitely earned. We do not like inequality of opportunity, even if the inequality is such as not to set us back but only affords a chance of advancement to our neighbor which does not come to us. We do not like to confess that we do not like to see our neighbor get something which we cannot get, but, speaking as human beings, we do not like it, unless it is offset by something to our own advantage. And we all find it more comfortable to have our compensation assured, irrespective of our merits. I do not know of any cure for these objections to scientific management.

"But the objections of organized labor are more easily met. Those which they avow are the threat involved to the skilled trades, which amounts to hostility upon the part of the aristocracy of labor to the interests of the democracy of labor, which I have already dealt with at sufficient length; and the charge of over-work,

of which I have admitted the possibility, in connection with all other systems of employment of labor, but of the existence of which I have challenged proof in any individual case in an arsenal of the Ordnance Department. An objection which has not been avowed by organized labor, but of whose presence evidence every now and then crops out, is the threat of scientific management to the labor unions as they are now conducted under their leaders, which is afforded by the inducement to the workman to tie up with the system which does more for him than his union does; and still another, unavowed, is the hostility of organized labor to the increase of productivity of the individual. There is so much evidence of this that I need not take up your time with proofs, but it is something for the world to refuse to tolerate, and to set its face against like flint. It has threatened the industrial supremacy of a great nation like England, and at the present time it is threatening its success in a desperate war. It would lessen the advantages of civilization, all of which have been well said by Mr. Taylor to depend upon the increased productivity of the civilized man over that of the savage. It rests upon the fallacy that more work done by one man must involve less opportunity for the employment of another; and upon ignorance of the fact that there is work for all of the people in the world as long as everybody does not have everything he wants. Non-employment results from bad economical administration, and not from any excess of productivity.

"The assault upon scientific management in the Government service will undoubtedly be renewed at the coming session of the Congress. The forces of organized labor are prepared for it, and their initial though insignificant victory at the last session indicates that, unless some other class of interested citizens should put themselves on the other side, they will win a substantial victory in the next contest. The meaning to the industries of the country of the expulsion from the Government service of the features of scientific management which contribute so much to the mutual advantage of employer and employee, is best understood by the industries themselves. It is my province to report the facts. Congress will act in accordance with the power of the impression which is made upon it of the wishes of the constituencies of its members.

"It has been more than once represented to me that I have increased the difficulty of maintaining scientific management in the Ordnance Department by calling it the Taylor system, and that I would have less difficulty if I should suppress this name, which is declared to be anathema to organized labor. I have not cared to do this. I regard Mr. Taylor as the father of scientific management, without intending to detract from the credit of its able apostles. We have employed Mr. Taylor's system, installed with the aid of an expert designated by him, and in its actual practice we have had a fair measure of the success which he promised. We hope we are not through with improvement and with the attainment of further success. I believe that the credit which is due to the founder of the system should be rendered by using his name in connection with the employment of it and I am unwilling to render the task of employing scientific management in the arsenals of the Ordnance Department more easy of accomplishment through the disassociation from it of the name of the great man to whom it is due, whose untimely death we so deeply lament."

#### Detroit Iron & Steel Company Improvements

The Detroit Iron & Steel Company, Detroit, Mich., will make a number of improvements in its blast-furnace plant. These will include the erection of a power building and a ladle house. The latter will be 32 x 85 ft., and will be equipped with a 25-ton crane. A 500-kw. turbo-generator and blower will be installed. An additional ore-handling bridge with a 165-ft. span, equipped with a 5-ton bucket, will be erected, duplicating one of the present bridges. The contract for this bridge has been placed with the Brown Hoisting Machinery Company, Cleveland, Ohio. The general contract for the improvements has been placed with Arthur G. McKee & Co., consulting and contracting engineer, Cleveland.

## PENNSYLVANIA FOUNDRY CODE

### Regulations for Safety and Sanitation in Foundries Going into Effect Nov. 1

The State Industrial Board of Pennsylvania has approved a set of regulations which provide a code for safety and sanitation in all iron and steel foundries. It will become effective Nov. 1. The code was drafted by a committee representing the State, leading foundrymen and representatives of the workers. The regulations embody a few features from other States, but in the greater part, were drafted to meet Pennsylvania conditions. The provisions, almost in full, are as follows:

Entrances to foundries shall be protected from Nov. 1 to April 1 of each year by a covered vestibule, so constructed as to eliminate drafts and of such dimensions as to answer ordinary purposes, such as the passage of wheelbarrows or small industrial cars. No locomotive shall be permitted to remain inside the factory during the loading or unloading of cars.

Main gangways, where metal is carried by hand, bull or truck ladles, shall not be less than 5 ft. wide. Truck-ladle gangways which are not main gangways shall not be less than 4 ft. wide. Bull-ladle aisles between floors shall not be less than 3 ft. wide. Single hand-ladle or buggy-ladle aisles between floors shall not be less than 18 in. wide. Where it is necessary to occupy the central portion of the floor space in the production of castings, continuous gangway space shall be provided.

Every gangway where industrial trucks are used shall be constructed of hard material of substantial character and the top of the rail shall be flush with the floor.

#### REMOVAL OF SMOKE, STEAM, GAS AND DUST

Where smoke, steam, gas or dust arising from any of the operations of the foundry is dangerous to health or eyes and where a natural circulation of air does not carry it off there shall be installed and operated hoods, ventilators, fans or other mechanical means of ventilation approved by the Industrial Board.

The cleaning and chipping of castings shall be done in cleaning rooms except that where traveling cranes, or where, in existing installations, cars are used for conveying castings into such rooms, a separating partition shall be erected which shall not be less than 12 ft. in height. In existing installations, where the crane cage or crane girders will not permit the erection of a 12-ft. partition, the height of the partition may be reduced sufficiently to permit of its clearance. Large castings may be chipped or cleaned by hand in the molding and casting room, provided sufficient protection is furnished by the use of a curtain or screen or some other means equally good to protect employees who are otherwise employed therein. This regulation shall not apply if mechanical contrivances are used for cleaning castings and the dust and particles arising therefrom are effectively removed at the point of origin by means of an exhaust system.

Where tumbler mills are used, exhaust systems shall be installed to carry off the dust, except where the mill is operated outside the foundry. This regulation shall not prohibit the use of a water barrel to clean castings. Sand blast operations shall be carried on in the open air or in a separate room used solely for such purpose. The milling of cupola cinders, when done inside the foundry, shall be carried on by an exhaust mill or water mill, each of a type approved by the Industrial Board.

The floor beneath and immediately surrounding the cupola shall slope and drain away from its base.

Cores shall not be blown out of castings by compressed air unless such work is done outside the foundry or in a special room or dustproof inclosure approved by the Industrial Board. Men employed in cleaning castings by compressed air or sand blast shall wear eye guards and helmets approved by the Industrial Board.

#### LIGHTING AND HEATING

Where natural light is insufficient properly to light the foundry, artificial light of sufficient power shall be provided, in the discretion of the Industrial Board.

Interior walls of foundries shall be whitened, in the discretion of the Industrial Board.

Proper and sufficient heat shall be provided and maintained in every foundry. Open fires may be used for the drying of molds or cores if coke containing less than one per cent of sulphur is used; also charcoal, gas or oils may be so used; where practicable, such drying of molds or cores shall be done at night.

All hand and bull ladles shall be dried in ovens or outside of the foundry.

Suitable facilities shall be provided for the thorough drying of employees' clothing.

#### SANITARY CONVENIENCES

In each foundry in which 10 or more persons are employed or engaged in labor, there shall be maintained for their use, in a place connected in such a manner that access thereto can be had without exposure to the open air, a toilet room of suitable size wherein they may change their clothes; such toilet rooms shall be provided with wash bowls of sufficient capacity, adequately equipped with hot and cold water service; such wash rooms shall be kept clean and sanitary and shall be properly heated during cold weather. There shall also be maintained, separate from said toilet rooms, a suitable water-closet.

[These run from 1 for every 10 persons to 1 for 25, according to the number of employees.]

Wash-rooms hereafter installed where 20 or more men are employed shall be provided with at least one shower bath with an ample supply of hot and cold water, and for every additional 50 men one additional shower bath shall be provided.

Individual lockers, arranged for locking, shall be provided for employees and shall be placed in a room used exclusively for such purpose, in the wash-room, the drying room or at convenient places in the molding room.

#### MAINTENANCE

Ladles, shanks, tongs, slings and yokes, skimmers and slag hoes used in the pouring of molten metal shall, prior to their use, be inspected daily as to their safety, by the men preparing and using them; and in addition a regular inspection as to their safety shall be made once a month by a man designated for that purpose. A monthly inspection shall also be made of the chains and cables on counterweights used in connection with drying ovens. Reports of such monthly inspections shall be made on forms prescribed by the Industrial Board.

All fire-ways connected with drying ovens, when built in the floor, shall at all times be protected by either a substantial protecting cover or a standard railing.

All trap-doors shall be guarded, when open, either by standard railings or watchmen, and all pits shall be properly covered or railed when not in use, and sufficiently guarded at other times.

All passageways and stairways shall be properly lighted and inclined runways and stairways, charging decks and platforms shall be safeguarded with standard railings.

All ladles pouring from the lip of 2000 lb. capacity, or more, shall be equipped with a worm geared device for tilting. All ladles not so equipped shall be changed to conform with this regulation on or before Sept. 19, 1917. All crane truck and trolley pouring ladles shall be so constructed that the center of gravity shall be below the bail unless ladles are equipped with a geared device approved by the Industrial Board; and shall be equipped with a clip to prevent over-turning.

Trunnions on flasks shall be capable of sustaining the loads they are required to handle. Trunnions hereafter constructed shall be carefully designed to carry the load they are to handle and constructed with a factor of safety of at least 10, including bolts where they are used. The diameter of the button shall be equal to the diameter of the groove plus one and one-half times the diameter of the sling used to handle the flask. Inside corners shall be well filleted and in order to prevent the sling slipping off or riding the button, the radius of the corner between groove and button shall be approximately equal to the radius of the sling used, the remainder of the inside-edge of the button to be straight. All trunnions constructed after Oct. 1, 1915, shall bear the date of their construction.

The use of high explosives on the foundry premises for the breaking of castings is prohibited unless effective protection is provided.

The breaking of castings by the use of a drop inside the foundry during working hours is prohibited. Where a drop is used for the breaking of castings or scrap outside of the foundry a permanent shield of heavy planking or other effective protection shall be provided.

Every employee shall use safety devices furnished for his protection by the employer, where there is a hazard connected with his employment.

#### WOMEN COREMAKERS

Where rooms in which core ovens are located adjoin rooms where cores are made by females and where the making of cores and the baking of cores are simultaneous operations, the partition between such rooms shall be constructed of concrete, hollow tile, brick, metal, or other material approved by the Industrial Board and there shall be in such partition only such openings as are required by the nature of the business.



All such openings in these partitions shall be vestibuled with a revolving device or double doors which shall be self-locking, or any other self-closing device equally effective, to be kept in such condition that gases, fumes, and smoke shall be effectually trapped.

No female shall be allowed to handle cores which have a temperature of more than 110 deg. Fahr.

No female shall be permitted to make or handle cores when the combined weight of core, core box and plate at which she is working exceeds 15 lb.

#### BRASS OR COMPOSITION METAL FOUNDRIES

The regulations relative to dust, smoke, gases or fumes, ventilation, sanitation, heat, light, gangways and aisles, safety appliances, washrooms, cleaning rooms, drying and locker accommodations, as specified for iron and steel foundries, shall apply to brass foundries, except that main gangways shall not be less than 4 ft. wide and gangways between molds or spill troughs shall not be less than 3 ft. wide.

When the crown plate of an upright melting furnace is elevated above the surrounding floor in excess of 12 in., the furnace shall be equipped with a platform guarded with a standard railing; and such platform shall be constructed of metal or other fire-resisting material, and shall extend along the front and sides of the furnace, flush with the crown plate and shall be at least 4 ft. in width and shall be clear of all obstructions during pouring time. If the platform is elevated above the floor in excess of 12 in. the lowering from it of crucibles containing molten metal shall be by mechanical means.

When the combined weight of a crucible, tongs and molten metal exceeds 100 lb., it shall be removed from the furnace and deposited on the floor by mechanical means.

When smoke finish is desired on molds made on benches or tubs, smoke boxes which shall effectually trap the smoke shall be used, connected with flues to the outer air.

When molders work side by side at least 5 ft. of space sideways shall be allowed for each man, and a clear space of 3 ft. shall be provided back of each man.

Hoods shall be provided, directly above all brass melting furnaces using gas or oil as fuel, which will effectually trap all gases and fumes generated, provided with pipes to lead the gases or fumes to outer air. Ventilators shall be provided over all other furnaces used for melting brass or composition metal, to effectually remove the gases above the furnaces.

Brass foundries shall be provided with natural light from at least two sides or from at least one side and skylights in roof.

All persons removing pots containing molten metal from furnaces or handling such pots shall be provided with protection for legs and feet.

Gangway dirt and floor scrapings shall not be riddled in the room where workmen are employed, unless it is so dampened as to prevent dust arising therefrom.

Stoves for drying molds, when located in the rooms used by workmen, shall be surrounded by a casing of fire-resisting material.

No brass foundry shall hereafter be constructed with a clearance less than 14 ft. between the lowest point of the ceiling and the floor, except that where a peak, saw tooth, monitor or arch roof is constructed the side walls may be of a minimum height of 12 ft.

#### CELLAR FOUNDRIES

No foundry shall hereafter be located in a cellar or basement unless the ceiling shall be at least 14 ft. in height, measured from the finished floor to the under side of the ceiling; and, if the foundry is located or intended to be located entirely in the front part of the building, unless the ceiling shall be in every part at least 6 ft. 6 in. above the curb level of the street in front of the building; or, if the foundry is located or intended to be located entirely in the rear part of the building, or to extend from the front to the rear, unless the ceiling shall be not less than 3 ft. above the curb level of the street in front of the building, and the foundry shall open upon a yard or court which shall extend at least 6 in. below its floor level; nor unless proper and adequate provisions shall be made for lighting and ventilation.

In case any foundry that was legally operated in a cellar or basement on Oct. 1, 1915, shall be discontinued or closed by the department, it can thereafter be reopened as a foundry only by complying with the provisions of the regulations relating to future foundries. The occasional use of a foundry for the purpose of evading this regulation shall not be deemed a continuance of use thereof.

The Baltimore & Ohio Railroad Company's new coal-handling plant at Baltimore, Md., will include two steam operated standard car dumpers, the contract for which has been placed with the McMyler-Interstate Company, Bedford, Ohio.

## Fewer New England Labor Disturbances

The strike at the Hendey Machine Company, Torrington, Conn., which lasted six weeks, has been settled through the intervention of the Federal conciliators, James A. Smyth of Renova, Pa., and Clifton Reeves of Trenton, N. J. The basis of settlement was a schedule of 54 hr. per week, 15 per cent increase in wages, and time and a half for overtime.

Reports from Providence, R. I., show that the backbone of the strikes at the plants of the Brown & Sharpe Mfg. Company and the Builders' Iron Foundry is broken. Both plants are but little inconvenienced by the number of men still idle, and are turning out nearly normal production.

At Hartford, Conn., the Pratt & Whitney Mfg. Company is continuing to recruit its working force from the ranks of the strikers and elsewhere. An effort of the men still out to reopen negotiations with the company through the intercession of a citizens' committee was declined by Vice-President B. M. W. Hanson, who courteously but firmly refused to discuss the company's affairs with persons not connected with it. So many men have returned to work that there is little likelihood of the strikers winning concessions from the company.

The strikers at the plant of the Max Ams Company, Bridgeport, Conn., are still out.

The labor leaders claim a strike of 25 hands at the H. E. Harris Engineering Company, Bridgeport, which is denied by Mr. Harris.

The trouble at the plant of the H. A. Matthews Mfg. Company, Seymour, Conn., has been settled by a compromise agreement of a 7½ per cent increase in wages.

The men who were out at the Corbin Screw Corporation and the North & Judd Company, New Britain, Conn., are back at work and conditions are nearly normal at the New Britain Machine Company, according to statements of the officials.

A lockout at the Standard Electric Time Clock Company, Springfield, Mass., was terminated by the men accepting a 50-hr. week which they had at first refused.

The employees of the Bosch Magneto Company, Springfield, Mass., are remaining at work pending an investigation of their complaints by the State Board of Conciliation and Arbitration.

The employees of the Duckworth Chain & Mfg. Company, Springfield, Mass., are on strike for an 8-hr. day, 20 per cent increase in wages and time and a half for overtime. About 40 women and 60 men are involved. The absence of President James Duckworth from the city has held up a reply to the demands.

The New London Ship & Engine Company, Groton, Conn., has refused demands of its 800 men for an increase of 15 per cent in wages, time and a half for overtime and double time for Sundays and holidays. In May, 1913, the company voluntarily gave its employees an 8-hr. day with 9-hr. pay. Six weeks ago the company voluntarily increased wages 10 per cent. It is rushed with work for the United States and foreign governments. About half of the men belong to the union, but many non-union men signed the petition.

About 1100 employees of the Eagle Lock Company, Terryville, Conn., are out. Many of them are women and girls. They demand a 50-hr. week instead of 50 hr. as at present, a half holiday with pay, time and a half for overtime, 25 per cent increase in wages for male operatives and a uniform wage scale for women workers of \$1.50 a day for day work. The strikers refused to join any union and selected an executive committee to represent them.

The State Board of Conciliation and Arbitration is holding meetings in Worcester, Mass., probing the causes of the strikes now in force, but its efforts to induce the manufacturers to agree to arbitration have been fruitless. The sessions are to continue this week and pending strikes are held up by agreement until the board has made its report. One after another the employers appearing before the board have declined to make any concession or submit to any form of arbitration the differences now existing. The Worcester manufacturers decline to listen to any proposal except that the men return to work under the conditions which



existed when they went out. It is the general opinion that the strikes will continue for some weeks longer and that they are likely to extend to other shops. Organizers of the Federation of Labor are active in other industries in the city. As a result of their efforts the Worcester County Employers' Association, comprising over 100 of the largest manufacturing establishments in the county, of which George I. Alden, president of the Norton Company and the Norton Grinding Company, is president, has posted in each member's plant a notice that the association stands for the principles and practices of the open shop, and that the members have resolved to stand together and resist any unreasonable demands made upon them. "In support of these principles," the notice adds, "we are prepared if necessary to close this plant indefinitely."

### Lackawanna Steel Company's Earnings

The statement of earnings issued by the Lackawanna Steel Company for the quarter and the nine months ended Sept. 30 shows a complete reversal of conditions prevailing in the corresponding periods of last year. The total income for the quarter, after deductions of all manufacturing expenses and fixed charges of subsidiary companies, was \$1,779,357.38, against \$303,834.92 in the third quarter of 1914, which is an increase of \$1,475,522.46. After deductions for interest on Lackawanna Steel Company bonds, debentures and notes and the usual charges and appropriations for sinking funds on bonds, exhaustion of minerals, depreciation, etc., the profit for the third quarter of this year was \$910,724.19, against a deficit for the corresponding quarter of 1914 of \$457,210.46, showing an increase of \$1,367,934.65. The detailed statement for the nine months ended Sept. 30 is as follows:

Comparative Statement of Income Account for Nine Months		
	1915	1914
Income from manufacturing and operating, after deducting all expenses incident thereto, including ordinary repairs and maintenance of plants and interest on bonds and fixed charges of subsidiary companies.....	\$2,702,778.97	\$651,845.01
Proportion of earnings on investments in companies not controlled, and of other annual income .....	222,698.89	268,172.29
Total .....	\$2,925,477.86	\$920,017.30
Deduct interest on Lackawanna Steel Company bonds, debentures and notes .....	1,230,783.34	1,312,275.00
Balance .....	\$1,694,694.52	*\$392,257.70
Less charges and appropriations:		
Sinking funds on bonds and exhaustion of minerals .....	207,482.65	188,260.90
Depreciation and accruing renewals .....	873,862.21	660,371.88
Total deductions .....	\$1,081,344.86	\$848,632.78
Profit for nine months.....	\$613,349.66	*\$1,240,890.48

\*Deficit.

The profit for the nine months of this year, it will be seen by the above figures, increased \$1,854,240.14 on the corresponding period of last year. The showing thus made is highly gratifying, as it places the company among manufacturing concerns operating at a good rate of profit. The management has had a long pull through lean years, with discouraging results for stockholders, and it is to be hoped that the great change wrought in the company's affairs may prove permanent.

The unfilled orders Sept. 30, 1915, are stated to have been 393,084 gross tons, against 166,344 tons Sept. 30, 1914.

The efficiency of preparedness as related to business, commerce and finance is announced as the subject of the first monthly meeting of the Efficiency Society to be held on Thursday evening, Oct. 21, in the rooms of the Merchants' Association, Woolworth Building, New York. John Calder, president Manufacturers' Equipment Company, Boston, is to preside.

Large government orders for American steel office fittings have been placed in the last two or three years by South Africa, especially for the Johannesburg district.

### AGAINST PRICE-CUTTING

#### Stevens Price-Maintenance Bill May Pass the Coming Congress

WASHINGTON, D. C., Oct. 18, 1915.—There has been an extraordinary revival of interest recently in the so-called Stevens price-maintenance bill on the part of manufacturers in many industries, and such pressure has been brought to bear upon Representatives and Senators elected to the new Congress that the advocates of this measure are confident that it will be passed at the coming session and promptly signed by the President. Whether this view is too optimistic is yet to be determined, but there can be no question that more than a majority of the House stands pledged to vote for the bill whenever it is called up.

A peculiar situation with reference to the Stevens bill prevailed throughout the last Congress. Prominent manufacturers and economists of reputation, in hearings before the House Committee on Interstate and Foreign Commerce, strongly urged a favorable report upon the bill, which grants to manufacturers the right to fix the price at which their goods shall be sold at wholesale and retail. No one opposed the bill before the committee; nevertheless it was smothered and the best efforts of its friends in the House were unable to bring it to a vote even in committee. Chairman Adamson of Georgia frankly announced his opposition to the measure, declaring it to be against the interest of the consumer, which it was the duty of Congress to protect, and in deference to the chairman's position no effort was made by members of the committee to send the bill to the House.

The position of the Stevens bill in the new Congress will be materially different. While Chairman Adamson will doubtless be re-appointed, the new committee is certain to include several who are pledged to the support of the bill. So strong has the sentiment become of late that it is predicted that unless the committee reports the bill, either with or without a recommendation a motion will be made on the floor to discharge it from the further consideration of the measure. This would bring the bill before the House for a direct vote.

So far as can be learned by the advocates of the Stevens bill, the opposition is confined to the so-called mail-order houses and the large department stores. The record discloses little or no direct interest on the part of these establishments in the matter, but the publishers of certain large daily newspapers, whose revenues are derived to a great extent from department store advertising, have taken up the cudgel in behalf of their patrons and are circularizing Congress in a systematic manner.

The Federal Trade Commission for some months has been investigating the general subject of price maintenance and the champions of the Stevens bill are hopeful that some conclusions may be reached in time for transmission to Congress early in the coming session. Secretary of Commerce Redfield has shown much interest in this problem, and while the Bureau of Corporations was in existence instituted the investigation which the Trade Commission subsequently took over. As the Secretary of Commerce has no jurisdiction over the Trade Commission, it is a question whether Secretary Redfield will feel called upon to make any recommendations in his forthcoming annual report, but it is known that he is deeply interested in a number of collateral questions and it is believed that his general recommendations will be of material assistance to those who are pushing the Stevens bill.

The advocates of price maintenance legislation have been recently greatly encouraged in their campaign by decisions handed down in the Federal courts. Judge Hough, in the United States Court for the southern district of New York, recently held that a manufacturer has a right to refuse to sell his goods to a dealer who re-sold them at less than the standardized price. Judge Hough held that, even from the standpoint of the consumer, it was important that a manufacturer should be permitted to build up a distribution system on a standardized price rather than to permit large numbers of retailers to be driven out of business by a few price-

cutters. More recently Judge Geiger, in the District Court of the United States for the northern district of Illinois, held to be legal contracts made by a manufacturer with a wholesaler or retailer, fixing the price at which certain patented articles should be sold. Judge Geiger differentiated this case from several heretofore decided against the manufacturer, pointing out that in the previous decisions the question at issue was the liability in damages of a retailer who ignored a price notice printed on the article or its container. A specific contract, the court held in this case, under which a wholesaler or retailer undertakes to sell the goods in question at a certain price is not only enforceable by law, but is in accordance with public policy.

W. L. C.

### Pittsburgh and Nearby Districts

The Youngstown Iron & Steel Company, Youngstown, Ohio, recently received an order from the Trussed Steel Concrete Company for a quantity of steel sheets to be made into window frames and sash. The pig iron to be converted into steel for these sheets was made in Mary furnace of the Ohio Iron & Steel Company on Thursday, Oct. 7, and was at once delivered in ladles to the open-hearth plant of the Youngstown Iron & Steel Company, where it passed through the several operations and was rolled into sheet bars on Friday. On Friday night at the Haselton works of the company the bars were rolled into sheets. The next day the sheets were delivered to the buyer. Only 48 hr. had elapsed from the time the steel company received the order for the sheets until they were made from the ore to the finished product and delivered.

Frank B. Ward has opened an office in room 502, Park Building, Pittsburgh, and will act as representative in the Pittsburgh district for the Elwell-Parker Electric Company, Cleveland, Ohio; Nazel Engineering & Machine Works, Philadelphia, Pa.; Cameron Engineering Company, East Stroudsburg, Pa., and J. D. Fate Company, Plymouth, Ohio.

On Thursday, Oct. 14, the Carnegie Steel Company blew in another Edgar Thomson furnace, making 10 stacks in blast and one idle at this plant. About Nov. 1 Edgar Thomson furnace A will be blown out for repairs. The Carnegie Steel Company now has 48 furnaces in blast and 11 out; the American Steel & Wire Company, all 9 stacks in; the National Tube Company, 10 in and 1 out, and the Illinois Steel Company, 24 in and 1 out. This makes a total of 91 stacks in blast and 13 out that are owned by the constituent companies of the United States Steel Corporation.

Remarkable progress has been made in building the new zinc plant of the American Steel & Wire Company at Donora, Pa. Friday, Oct. 15, was the one hundredth working day at the plant, and it started to make spelter this week. It is what is known as a 10-unit plant, having 912 retorts to each unit, or 9120 in all. Some new ideas are embodied in its construction, such as hollow tile for several buildings, not used before in this class of work. The plant will have a capacity of about 40,000 tons of spelter per year. While it will produce a very large amount of sulphuric acid, the exact quantity is not yet known. The plant is on a site of 40 acres, and the spelter output will be used by constituent companies of the Steel Corporation.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, announces that it is now handling through its prime mover department the sale of the standard products of the Westinghouse Machine Company. E. H. Sniffin, formerly vice-president and sales manager of the Westinghouse Machine Company, has been appointed manager of the prime mover department, and as such will direct the sales of the product of this company, as he has done in the past. Mr. Sniffin became associated with Westinghouse, Church, Kerr & Co. in 1888, first as salesman and afterward as sales manager. In 1903, when the Westinghouse Machine Company organized a sales department, he was made sales manager, and in 1905 was elected vice-president. A marine department of the Westinghouse Machine Company has also been established, with headquarters at East Pitts-

burgh, which will handle all matters pertaining to marine refrigeration and main propulsive machinery for vessels and auxiliaries used in connection with this class of apparatus. All Atlantic seaboard and Great Lakes negotiations for the sale of marine products will be handled by H. M. Southgate, district manager, located in the Bibbs Building, Washington, D. C. The Pacific coast marine business will be handled by Hunt Mirk & Co., 141 Second Street, San Francisco, Cal.

The Wright Motor Car Company, Huntington, W. Va., has plans for a new garage. Equipment for a repair shop will be needed.

The Virginia-Western Power Company, Clifton Forge, Va., is reported to have plans for an additional steam power plant at Hinton, W. Va., to serve various towns in that section.

The West Virginia Brewing Company will remodel its plant at Huntington, W. Va., for use as a packing plant. The proposed expenditure for new equipment is \$50,000.

The American Vacuum Can Company, Charleston, W. Va., is being organized with \$400,000 capital stock and will establish a plant at Dunbar, near Charleston, to make vacuum milk cans and other metal containers. U. G. Fletcher and Fred Paul Grosscup are the organizers. Machinery costing \$50,000 to produce 1000 cans a day will be purchased. The factory will be 150 x 200 ft., of brick and steel.

The Marietta Mfg. Company, Marietta, Ohio, will build a foundry at Point Pleasant, W. Va.

The Carnegie Steel Company is building an entirely new blast furnace at Bellaire, Ohio, to replace stack No. 1. The contract for this furnace, including gas mains, dust catchers and all other equipment, has been placed with the Riter-Conley Mfg. Company, Pittsburgh. Construction of the furnace will start in about two weeks; it is expected to be completed about July 1, and it will have a daily capacity of about 450 tons. The Riter-Conley Company has other large contracts for structural and plate work and will soon put on a night force.

The Pittsburgh Tool Steel Wire Company, Monaca, Pa., maker of cold drawn tool steel and drill rods, will make additions to its plant that will considerably increase its capacity.

The Franklin Foundry Company, Franklin, Pa., has been incorporated with a capital stock of \$25,000, and will build a foundry for the manufacture of steel castings.

The Pennsylvania State Board of Education has recognized the apprentice schools operated by the Westinghouse interests, the Carnegie Steel Company, and several other large corporations in the Pittsburgh district. Under the new child labor law, after Jan. 1, any boy or girl under 16 who has had less than a sixth grade schooling must be sent to school for 8 hr. a week at the expense of the employer.

The William Tod Company, Youngstown, Ohio, will inaugurate an 8-hr. day of three shifts each in its machine shops, and its machinists will receive the same rate of wages that was formerly paid for 9 hr. The new arrangement will go in effect Saturday morning, Oct. 16.

The Republic Rubber Company, Youngstown, will make large additions to its tire department and will add more molds and other necessary equipment.

The Brier Hill Steel Company, Youngstown, has placed an order with the William B. Pollack Company, also of Youngstown, for two 100-ton ladles, stacks and accessories, for its new open-hearth furnace.

The Crescent Metals Company, Pittsburgh, with a capital stock of \$100,000, has been incorporated by Eric Fisher Wood, treasurer, First-Second National Bank Building, Pittsburgh; Alex Laughlin, Jr., and John C. Slack, to conduct a smelting, treating, manufacturing and refining business.

The George T. Ladd Company, engineer, Farmers Bank Building, Pittsburgh, has recently received several large contracts for installation of its Milne water-tube boilers. One is for the new power plant of the Tug

River Power Company, Spriggs, W. Va.; another for the Mahoning County Light Company, Youngstown, Ohio, and another, comprising two 500-hp. boilers equipped with twelve Westinghouse retort underfeed stokers, for the plant of Spang, Chalfant & Co., Sharpsburg, Pa.

The Engineers' Society of Western Pennsylvania, Pittsburgh, will award two medals to the authors of the best and second best papers presented during the year. Papers will be judged on the following points: Value to engineering profession, originality of subject matter and treatment.

According to estimates made by the banks preparing payrolls for the large industrial corporations in the Pittsburgh district, the payrolls for October will exceed any month for years by at least 15 per cent. The banks state they will approximate \$32,000,000. The next best payroll month in the Pittsburgh district was October, 1911, when the amount disbursed reached about \$26,000,000.

The new by-product coke plant of the Republic Iron & Steel Company at Youngstown, Ohio, will be in operation about Nov. 1. Its 75 ovens will give the company a total of 143 Koppers ovens. The Martin plant of beehive ovens in the Connellsville region has been closed but the company will continue to operate about 200 ovens to furnish coke for the Hall furnace at Sharon and Atlantic furnace at New Castle, Pa. It owns three beehive coke plants in the Connellsville region—the Martin, 244 ovens; the Atcheson, 120 ovens, and the Republic, 300 ovens.

After being tested for about a year, at the Lemont and Continental No. 1 plants of the H. C. Frick Coke Company, preliminary arrangements are being made by that company for the exclusive installation of a coke oven door for the beehive type of oven invented by E. C. Auld, Scottdale, Pa.

The Sharpsville Furnace Company, Sharpsville, Pa., is getting its furnace ready for blast, and it is expected to go in about Nov. 15. This furnace is operated only in times of abnormal demand for Bessemer pig iron, and has a capacity of 150 to 175 tons per day.

The McKeefrey Iron Company, Leetonia, Ohio, is preparing its furnace for blast and expects to start it in November. It has a daily capacity of about 300 tons.

The Bonnet Company, Canton, Ohio, has started foundation work on a machine shop, 40 x 160 ft., of brick and steel, one story, to cost \$20,000. It is to be completed within two months.

The McCoy-Brandt Machinery Company, dealer in machinery, House Building, Pittsburgh, has been incorporated with a capital of \$15,000 by Harry E. McCoy, Bellevue, Pa.; Walter E. Brandt, Crafton, Pa., and Herman J. Roth, Pittsburgh. It has taken over the business of McCoy & Brandt, established for many years.

The Brier Hill Steel Company, Youngstown, has decided to proceed at once with the construction of two more open-hearth steel furnaces. The company has been operating seven furnaces, has just completed another, and with those proposed it will have ten.

At the annual meeting of stockholders of the Carbon Steel Company, held in Pittsburgh Oct. 18, directors were re-elected as follows: Charles McKnight, Gilbert G. Thorne, George F. Macrum, Edward C. Hoyt, Edward F. Slayback, Dean R. Wilson and Charles E. Middleton. Officers were re-elected as follows: Charles McKnight, president; Gilbert G. Thorne and George F. Macrum, vice-presidents; Dean R. Wilson, treasurer, and W. W. Noble, secretary. The executive committee consists of Charles McKnight, Dean R. Wilson and Charles E. Middleton. The company has been making some improvements to its plant, consisting of a large addition to the shipping shed and the installation of a large turbine and has decided to install an electric furnace, but work on the latter will not likely be started for some time.

The Pittsburgh office of the Hilles & Jones Company, Wilmington, Del., has been moved to larger quarters in the Oliver Building, room 235.

## OBITUARY

ERNST SCHIESS, president of the German Association of Machine Tool Builders, died in Berlin, Germany, Sept. 14, aged 75 years. He was the most prominent man in this field of German industry, and the fruits of his work in the building of large machine tools are well known in this country. He was president of the Düsseldorf Chamber of Commerce for a number of years, and in 1898 became president of the German Association of Machine Tool Builders, which office he thus held 17 years.

FREDERIC H. EVANS, Brooklyn, N. Y., died at his home Oct. 16, aged 77 years. He was born in Maine, and went to Brooklyn at an early age. He founded the F. H. Evans Iron Works, about 40 years ago, for the manufacture of expansion bolts. He had always taken a deep interest in civic affairs. He leaves his widow and three sons.

DR. JOHN C. PRICE, chief of the division of hygiene and engineering of the Pennsylvania Department of Labor and Industry, died at Camp Hill, near Harrisburg, Pa., Oct. 13, aged 44 years. He was born at Scranton, Pa., and was educated at the University of Pennsylvania. He leaves his widow and a daughter.

## Ferroalloys and High Speed Steel

The war has had an unusual effect on the supplies and prices of ferroalloys used in high speed steel making. While considerable quantities of these come from domestic sources, importations have always been considerable. The effect of the war is discernible from the following table of importations of ferroalloys used in making high speed steel, aside from ferrosilicon and ferromanganese, by quarterly periods in 1913-14 and 1914-15, in gross tons:

	Third Quarter		Fourth Quarter		First Quarter	
	1914 Tons	1913 Tons	1914 Tons	1913 Tons	1915 Tons	1914 Tons
Tungsten and the alloy	16	67	8	147	2	71
Chromium and the alloy	75	52	1	32	5	103
Titanium and the alloy	6	..	..	..	..	6
All other alloys used in steel	16	..	63	90	5	98

Up to April 1, 1915, the last official Government data, the imports had dwindled to almost nothing. The price of tungsten has risen from 60-65c. per pound before the war to \$5 per pound very recently.

High speed steel prices have advanced decidedly. It is stated that since July high speed steel has risen from 65c. to about \$2.54 per pound on a basis of  $\frac{3}{8}$ -in. and larger; that several large producers have withdrawn from the market canceling all contracts. Even high speed steel scrap is commanding a good price for remelting.

## Lessening Imports of Ferrosilicon

Imports of high-grade ferrosilicon in July, 1915, were only 234 gross tons, as compared with 386 tons in June. In July, 1914, they were 623 tons. For seven months to Aug. 1, 1915, the imports were 3546 tons against 3473 for the same period in 1914. The lessening imports, practically entirely from Canada, are probably due to the increased exports to Europe by the Canadian producer. For the third quarter of 1914 the imports were 2091 tons; for the fourth quarter, 1205 tons, and for the first quarter of 1915 they were 1626 tons.

Announcements now appearing in the daily press, regarding the proposed Ford process, by which an iron foundry can successfully take molten iron from a blast furnace and thus make cheaper gray-iron and malleable castings, doing without a cupola, were anticipated in an article in THE IRON AGE of Aug. 12, entitled "Ford Raw Materials Project."



## PERSONAL

### William Whigham

William Whigham, who was recently elected one of the three vice-presidents of the Carnegie Steel Company, Pittsburgh, the other two, who have served for several years, being H. P. Bope and W. W. Blackburn, was born Jan. 4, 1866, at Camden, near McKeesport, Pa. His early education was received in local schools, and in 1884 he entered the Stevens Institute of Technology at Hoboken, N. J., and was graduated in 1888, receiving the degree of mechanical engineer. His first



WILLIAM WHIGHAM

position was as a draftsman for the Thomas Carlin's Sons Company, Pittsburgh, and later he was employed as engineer in the offices of Julian Kennedy, also at Pittsburgh. Late in 1892 he entered the employ of the Carnegie Steel Company as engineer in the armor plate department at the Homestead steel works, whence he was transferred to the general engineering offices. In 1895 he was sent to Russia on armor plate contracts for the company. In 1899 he was appointed steam engineer of the Homestead steel works, and in 1901 was appointed superintendent of the company's Howard Axle Works. In 1905 he was appointed assistant to A. C. Dinkey, president Carnegie Steel Company, which position he held until Oct. 7, 1915, on which date he was elected a director and vice-president of the company.

J. H. Morrison, formerly with the Central Foundry Company as general sales agent, has been appointed general sales manager for the Warren Foundry & Machine Company, manufacturer of cast-iron pipe. His headquarters will alternate between the plant at Phillipsburg, N. J., and the general office at 11 Broadway, New York.

Irving B. Harrison, of the Allied Machinery Company of America, sailed Oct. 2 to join the force in the company's Paris office.

W. U. Follansbee, president Follansbee Brothers Company, Pittsburgh, maker of tin plate and sheets, has been appointed one of the members of the Lake Erie & Ohio River Canal Board of Pennsylvania.

F. T. Snyder, president Snyder Electric Furnace Company, Chicago, will present a paper before the

October meeting in Pittsburgh of the American Chemical Society, describing an electric furnace for performing industrial operations at temperatures above 2000 deg. C., claimed to be adapted to operate reliably on powdered material with a holding capacity as large as 10 cu. ft. of charge. Commercial operations, hitherto impossible at lower temperatures, are said to be rendered practicable by this furnace.

N. A. Helmer, sales engineer at Havana, Cuba, for the Hooven, Owens, Rentschler Company, is pending a week at the company's plant in Hamilton, Ohio.

Frank A. Moeschl, general manager of sales, Newport Rolling Mill Company, Newport, Ky., has gone to the Pacific Coast, combining business with pleasure.

Frank E. Blake of New York has been appointed real estate manager for the Remington Arms & Ammunition Company and the Union Metallic Cartridge Company to carry out the plans in connection with real estate and housing problems incident to the establishment of the Remington plant and the expansion of the Union Metallic plant at Bridgeport, Conn.

William Westerman, superintendent of the Coe Brass Company branch of the American Brass Company, Ansonia, Conn., has resigned after 32 years' service with the company. He will become manager of the rolling mills of the Western Cartridge Company, Alton, Ill.

Charles W. Baker, formerly New York manager of sales of the Carnegie Steel Company, has been elected a director of the American Zinc, Lead & Smelting Company.

Charles Elbert Curtis, for 12 years with the Cambria Steel Company at Johnstown, Pa., but more recently with the Nickel Plate Railroad, has been appointed superintendent of buildings and grounds of Cornell University, Ithaca, N. Y.

Frederic Nicholls has been appointed acting president of the Dominion Iron & Steel Company, owing to the continued indisposition of President J. H. Plummer.

Henry D. Hibbard, consulting metallurgical engineer, Plainfield, N. J., has gone to Australia on professional business. He is scheduled to leave San Francisco Oct. 26.

H. S. Endsley, for twenty-three years solicitor and general agent of the Cambria Steel Company, Johnstown, Pa., will retire Dec. 1.

J. W. Burdick, president West Penn Steel Company, Brackenridge, Pa., has been elected a director of the Chicago, Rock Island & Pacific Railway.

Harry J. West has been appointed assistant superintendent of the Gautier works of the Cambria Steel Company, Johnstown, Pa., succeeding Clarence Metessier, deceased.

Bernard E. Pollak, treasurer and general manager Pollak Steel Company, Cincinnati, Ohio, has opened an Eastern office for the company in suite 2653 Equitable Building, New York City.

Neil E. Salsich has been appointed assistant general manager of sales of the Pennsylvania Steel Company, effective Oct. 1. He went with the company in 1903, was assigned to the Boston office in 1906, was transferred to Chicago in 1907, and in 1911 was appointed district sales manager at Steelton, Pa., where he has been since then.

John C. Schmidt, president Standard Chain Company, Pittsburgh, has also been elected president of the Pullman Motor Car Company, York, Pa. This will not interfere in any way with his duties as president of the former company.

A. F. Alderdice, some time ago appointed assistant to President W. A. Thomas of the Brier Hill Steel Company, Youngstown, Ohio, has been elected a director of the company to succeed Charles F. Thomas, who resigned recently to become identified with the Western Reserve Steel Company, Niles, Ohio.

Charles J. Graham, Graham Nut Company, Pittsburgh, was elected president of the American Hard-

ware Manufacturers' Association at the annual convention at Atlantic City, N. J., Oct. 15. Other officers chosen were as follows: First vice-president, Frederick H. Kayne, Greenfield, Mass.; second vice-president, Fayette R. Plumb, Philadelphia; third vice-president, Roland Gerry, Jones & Laughlin Steel Company, Pittsburgh; secretary-treasurer, F. J. Mitchell; executive committee, A. W. Bowman, Hartford; Charles E. Bishop, Lawrenceburg, Ind.; A. M. Birge, Anderson, Ind.; R. B. Jones, Clyde, Ohio; George Price, Charleston, W. Va.; Paul Heller, Philadelphia; S. S. Vaughan, Chicago; Frank Disston, Philadelphia.

At the annual meeting of the stockholders of the Colorado Fuel & Iron Company J. B. McKennan, general manager of the company, and W. B. Dickson, secretary and treasurer of the Midvale Steel & Ordnance Company, were elected directors. Officers were re-elected at a subsequent meeting of the directors.

### Pittsburgh Foundrymen's Association

The monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Pittsburgh, on Monday evening, Oct. 18, preceded by a dinner. Shimer & Co., Inc., and the Allen S. Davison Company, both with offices in the Oliver Building, Pittsburgh, were elected members.

J. E. Johnson, Jr., of New York addressed the meeting on "What Is Good Iron?" He discussed his well-known theories regarding the benefits of oxygen in iron as well as his recent ideas regarding the elimination of oxygen from iron, freeing it from chilling properties. This latter theory has been formulated in a U. S. patent, described in THE IRON AGE of Oct. 7. The speaker emphasized that the results of his investigations and experience had shown that introducing oxygen strengthened the iron, reducing the size of the flakes of graphite while removing the oxygen caused the iron to lose its chilling properties and be non-resistant to injury by high temperatures, as well as causing the graphite to arrange itself in larger flakes. While sulphur and silicon determined the amount of graphite, oxygen decided its shape or form in the iron.

Mr. Johnson was able to state that recent experiences, brought to his attention by others, were added testimony in favor of both of these contentions.

### Large New Tin-Plate Plant at Gary

The American Sheet & Tin Plate Company will erect at Gary, Ind., a tin-plate plant to contain 24 hot tin mills with its complement of cold mills. All details of the new plant have not been made, but construction work will soon be started. This will not be the largest individual plant of the American Sheet & Tin Plate Company, as reported. The company's Shenango works at Newcastle, Pa., have 30 mills; the American works at Elwood, Ind., 28 mills, and the Monessen works at Monessen, Pa., 25 mills. The new Gary works will be built primarily to supply tin plate for the Chicago district and Middle West trade. The plant will have an annual capacity of about 84,000 tons of hot rolled tin-mill products.

### New By-Product Coke Plant

A by-product coke plant will be erected in connection with the Dover blast furnace, Canal Dover, Ohio, by the Dover By-product Coke Company, composed of M. A. Hanna interests. A contract has been placed for Roberts ovens, with a daily capacity of 440 tons.

The American Steel & Wire Company has commenced the erection of an addition to its Cuyahoga works, Cleveland, Ohio, that will increase this plant's wire-drawing and galvanizing capacity 25 per cent and involve an expenditure of \$750,000. The contract for the concrete foundation for one building, 400 x 435 ft., has been placed and other contracts will be awarded shortly. The building on the way will be of brick and heavy steel construction.

### German Steel Trade Conditions in September

The statement of the German Steel Works Union, issued after its regular meeting on Sept. 23, 1915, gives the following general review of the condition of the German steel trade:

In semi-finished steel the domestic deliveries were about the same as in August with very little change in the demand of consumers. Last quarter sales have been made at unchanged prices and terms. Business with neutral countries has undergone no change since the last meeting.

In railroad material the Bavarian State Railways has placed its orders for heavy permanent way material for 1916 which exceed those of last year. The orders of the Prussian and Imperial Railways for 1916, already placed, are considerably less than those for 1914. With neutral countries several important contracts have been closed and others are being negotiated. The influx of orders for grooved or tram rails is not of consequence since demand from domestic and neutral sources has been insignificant. Mine rail orders maintain about the same volume as for August.

The domestic market in shapes is unchanged. Business is dull owing to the quietness in the building trades. As contrasted with the preceding month, however, specifications for structural and car material were good. It was decided to make sales for the last quarter at the present prices. The condition of trade with neutral countries is still dull, since building activity with a few exceptions is slack.

The next meeting was set for Oct. 28, 1915.

### The Union Steel Corporation of South Africa

The steel output of the Union Steel Corporation of South Africa at Vereeniging for the twelve months of 1914 was 400 tons per month, according to the annual report of the Department of Mines and Industries of South Africa. The works are to be put on a sounder commercial basis by the addition of a 15-in. mill, a 22-in. blooming mill and additional melting and reheating furnaces. The output, bars of all sections, fencing standards and light rails up to 20 lb., has sold readily. The new plant is expected to roll rails up to 35 lb. and to produce 10,000 tons of products per year. Furnaces and automatic machines for making bolts, nuts and rivets are now starting to operate. The company employs about 70 white and 100 colored laborers. It has a very large stock of scrap obtained from the South African railroads, much of which is unsuitable for use. Other facts regarding the operation and equipment of this plant were printed in THE IRON AGE of Feb. 4, 1915.

### Steel Conditions in Belgium

Recent reports state that in the Liege district of Belgium only 6800 men are employed in the iron industry out of a total of 14,700 in normal times. The Cockerill works are employing 5200 in the blast furnaces, rolling mills and forge departments. Two small furnaces are in blast yielding about 100 tons daily. In the Charleroi district the Providence works have one furnace in blast with a daily output of 150 tons. A revival of the steel industry is said to be only possible if Luxemburg ores can be obtained by a reduction of the high freight rates. Available raw materials are becoming scarcer and the industry may be brought to a total standstill.

### German Steel Shipments Still Decreasing

August shipments of the German Steel Works Union were 250,080 metric tons against 258,092 tons in July and 94,984 tons in August, 1914. Aside from August, 1914, this is the lowest month of the war period, with two exceptions, September and November, 1914, with 245,194 and 246,088 tons respectively. In 1913 average shipments per month were 528,204 tons. The August shipments consisted of 59,303 tons of semi-finished steel, 120,057 tons of railroad material and 70,720 tons of shapes.

## Judicial Decisions

ABSTRACTED BY A. L. H. STREET

**INJURY TO EMPLOYEE IN HANDLING HEAVY MACHINERY.**—When an inexperienced man is engaged in the movement of heavy machinery, his foreman is legally bound to give him proper instructions how to do the work in a manner tending to avoid danger to himself. Whether it was negligent to move a heavy piece of machinery by "pinching" it along with scantling, instead of using a block and tackle, was a question for the jury. (Alabama Supreme Court, *Ward vs. Alabama Fuel & Iron Company*, 69 Southern Reporter, 621.)

**ACCIDENTS BEYOND SCOPE OF EMPLOYMENT.**—An employer is not liable for injury sustained by an employee while gratuitously and unauthorizedly doing something beyond the scope of his employment. (Alabama Supreme Court, *Quinton vs. Republic Iron & Steel Company*, 69 Southern Reporter, 604.)

**RIGHT TO REPAIR OR IMPROVE A PATENTED DEVICE.**—The purchaser of a patented device is not only entitled to use it until it is worn out but is at liberty to repair or improve it as he sees fit for his own use. (United States Circuit Court of Appeals, Fifth Circuit, *J. M. Burguières Company vs. Deming Apparatus Company*, 224 Federal Reporter, 956.)

**SELLER'S WAIVER OF RIGHT TO RECLAIM GOODS.**—Although goods were shipped from New York to Boston on condition that the purchaser might reject them if they proved to be unsatisfactory and that otherwise he should send a check at once, the seller waived right to reclaim the goods as against the trustee for the buyer in subsequent bankruptcy proceedings, where for twenty-one days the seller did not complain of the buyer's failure to remit nor attempt to retake the goods. (United States District Court, District of Massachusetts, in re *O'Callaghan*, 225 Federal Reporter, 133.)

**SUFFICIENCY OF SIGNATURE.**—When an instrument is required by law to be signed, a printed signature is sufficient if the paper discloses an intent to adopt it as such, as where an officer or representative of a company signs his name or initials below the printed name of the company. But the naked printed name is not sufficient. (United States District Court, Western District of Washington, in re *Frankel*, 225 Federal Reporter, 129.)

**VALIDITY OF UNRECORDED CONDITIONAL SALE CONTRACT.**—Under the statutes of Georgia, failure of the seller of property, to which he has reserved title until payment of the price, to record the contract does not prevent him from reclaiming the property, although it may have been intermingled with other property of the buyer covered by a pre-existing mortgage, which purported to include after-acquired property. (United States District Court, Southern District of Georgia, *Union Trust Company vs. Beach Mfg. Company*, 225 Federal Reporter, 93, 95.)

**MECHANIC'S LIEN FOR STRUCTURAL STEEL FURNISHED.**—A creamery company contracted for structural steel to be used in a proposed building, and later the company's officers organized a building company to erect the structure. Held, that the company which furnished steel to the building company was entitled to both judgment against the building company and a mechanic's lien to secure payment. As to the lien, it attached to all steel actually furnished under the contract, although all of it may not have been placed in the building. As against a prior mortgage, the lien is superior so far as the building is concerned, but inferior as a lien against the land. The lien of the steel company is superior to that of the principal contractors, under the Colorado statutes. (Colorado Supreme Court, *Atkinson vs. Colorado Title & Trust Company*, 151 Pacific Reporter, 457.)

**CONSIGNEE'S DUTY TO RECEIVE DELAYED FREIGHT.**—In upholding the right of a consignee of a pump worth only about \$11 to refuse to receive it where the carrying express company had negligently delayed delivery, and to hold the company for the value of the shipment, it is held that, while ordinarily it is the duty of a consignee to receive the goods when tendered and dispose

of them for what can be procured for them, and thus minimize the loss occasioned by the delay, this rule applies only to goods which have substantial value. But where the article is second-hand, and of little value and unsalable, and after deducting for trouble and expense for handling it, there is little value left in the thing, it may be rejected after having been delayed in delivery for an unreasonable length of time. (South Carolina Supreme Court, *Poore vs. Southern Express Company*, 86 Southeastern Reporter, 21.)

**WAIVER OF BREACH OF WARRANTY.**—When machinery is sold under warranty as to its soundness or efficiency, but on condition that the buyer give notice in writing to the seller, as well as to a local agent, of any defects found, and that defective machinery shall be returned by the buyer to be replaced, he is not entitled to rely upon a breach of such warranty where he has failed to comply with such conditions. Under such a contract notice to the local agent alone is not sufficient. (Utah Supreme Court, *Consolidated Wagon & Machine Company vs. Barben*, 150 Pacific Reporter, 949.)

**DUTY TOWARD INEXPERIENCED MACHINE OPERATORS.**—An employer of an inexperienced girl put at work at a machine press, used to offset or roll the joint on door hinges, was under legal duty to give her reasonably full instructions to inform her how she might avoid injury to herself; the scope of the instructions depending upon incidental hazards of which, through her inexperience, she could not reasonably be supposed to know. (Pennsylvania Supreme Court, *Reinhart vs. Griffin Mfg. Company*, 95 Atlantic Reporter, 102.)

**MANUFACTURER'S RIGHTS ON BUYER'S REPUDIATION OF CONTRACT.**—When a buyer repudiates a contract under which articles are to be manufactured for him, the manufacturer is entitled to recover damages resulting from the breach of agreement, but is not entitled to enhance his recoverable damages by proceeding with the manufacture of the articles after being notified that they would not be received. (Delaware Supreme Court, *Philadelphia Lamp Mfg. Company vs. Delaware Marine Supply Mfg. Company*, 95 Atlantic Reporter, 235.)

**PROTECTION OF TRADE NAMES.**—Persons engaged in one line of business in a town have equal rights in using the name of the place and words indicating the nature of the business. But where one manufacturer or dealer has adopted and acquired the right to use, as a trade name, a combination of words which indicates his place of business and also is descriptive of his product, and another manufacturer engaged in the same business in the same town, and having the right to use the same words to indicate his location and the nature of his business, thereafter combines such words into a trade name for himself which is, in form, so nearly like that previously adopted by his competitor as to mislead the public, it constitutes unfair competition. If the one second in point of time desires to incorporate such words in his own trade name, he must use them in such form, or combine them with other words in such manner, that his trade name will be fairly distinguishable from that of his competitor. (Minnesota Supreme Court, *Rodseth vs. Northwestern Marble Works*, 152 Northwestern Reporter, 885.)

**RECLAIMING PROPERTY SOLD TO INSOLVENT PERSON.**—A company which sold supplies to a concern which was known by its managing officers to be insolvent, the company being ignorant of that condition, is entitled to recover the property as against the concern's trustee in bankruptcy. (United States District Court, Northern District of Ohio, in re *Sycamore Grain & Milling Company*, 221 Federal Reporter, 468.)

**LIMITING VALUATION OF FREIGHT.**—When a carrier has two rates covering a given class of freight, one applying if the valuation is above a specified amount, and the other, if the valuation is less, a shipper under declaration of a low valuation is estopped to assert liability of the carrier to a greater amount for loss in transit. (United States District Court, Eastern District of Michigan, *American Brake Shoe & Foundry Company vs. Pere Marquette Railroad Company*, 223 Federal Reporter, 1018.)



# Machinery Markets and News of the Works

## BIG MUNITIONS CONTRACTS

### Cartridges, Rifles and Rapid-Fire Guns

#### Strike Situations Easier in Cincinnati and Elsewhere and Settlements Near—Employers Helped by Public Sentiment

Reports indicate that the placing of gigantic contracts for war munitions is not at an end. Specific instances which have just come to light include a contract placed with the Bradley Construction Company, New York, for the manufacture of cartridges, small arms and a new type of machine gun, representing a value of \$50,000,000. The contract is with Russia whose agents closed the deal last Saturday. The Canadian Car & Foundry Company has received from J. P. Morgan & Co. an additional order for 5,000,000 shells. The French Government is reported to have placed a munitions contract having an aggregate value of \$76,000,000. The order specifies 1,000,000 rifles and an enormous quantity of rifle cartridges, and is to be filled by a new company known as the New Haven Equipment Company, organized for the purpose. It is said that certain department heads of the Remington Arms & Ammunition Company are connected with the new company.

Throughout the country there is a continuance of activity in the line of new plants and extensive additions, which means new demand on the already overcrowded machine-tool builders. The strike situation is somewhat better in all districts, and it is the belief in Cincinnati, which was particularly hard hit, that the trouble in twenty-six plants in that city will soon end. Public sentiment has not been with the strikers, and this has been a potent influence in Cincinnati.

In New York the Eddystone Munitions Company has been doing some large buying, but the trade is more encouraged by a betterment in demand from normal industrial sources.

The R. B. Philipps Mfg. Company, Worcester, Mass., which has war contracts aggregating many millions, is reported to have purchased a large paper plant at Portsmouth, N. H., which it will convert to its uses. The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has plans for a brick and steel building, 75 by 158 ft. Hiram Maxim is authority for the statement that the Maxim Munitions Company has an unlimited order from Russia for a new rapid fire gun.

Detroit is experiencing some labor troubles, but they are of a minor character and there appears to be no general unrest in that city. The Briscoe Motor Company, Jackson, Mich., has completed plans for a new plant to cost \$100,000.

The foreign demand for machine tools holds up in Cincinnati, with the larger sizes of lathes in the lead. Purely domestic business is slow, and the makers of cotton oil mill machinery have just finished an unsatisfactory season. The Wright Aeroplane Company,

Dayton, Ohio, has been taken over by Eastern capitalists, and it is understood that the plant will be enlarged at an early date. Milwaukee reports that wood-working machinery is dull, and the makers are turning their attention to metal-working machinery.

In Chicago the unprecedented demand continues and delivery promises impose increasing burdens, although there are occasional reports of slackening inquiry.

The Ingalls-Shepard Forging Company, Harvey, Ill., is buying considerable equipment for its new additions. The company is running double-turn on domestic business. The Stewart-Warner Speedometer Corporation, Chicago, will erect a six-story factory to cost \$250,000.

Demand is active from many directions in Cleveland. The Van Dorn & Dutton Company, Cleveland, will begin the erection of two large buildings at an early date, and other notable extensions are mentioned.

## New York

NEW YORK, Oct. 19, 1915.

Dealers in machine tools say it is easy to exaggerate the betterment in the demand emanating from the ordinary industrial field, but an undoubted improvement exists. One branch office booked six orders from as many purchasers, none of whom wanted the machines for war business. A prominent dealer has found continued activity on the part of the automobile manufacturers. Of course, war business continues to dominate the market and some large sales have been made, both for export and domestic delivery. The Eddystone Munitions Company, which is allied with the Baldwin Locomotive Works, recently issued a list and already has placed some large orders for shell-making machinery.

The strikes in various parts of the country continue a disturbing influence with both operating and selling forces, as they are certain to delay deliveries. Never before has there been such a demand for second-hand machines, nor have they been sought so eagerly. Some of the principal sellers are making an organized search for such equipment and it is surprising the number which are found available. They often are discovered in unexpected places.

The Engineering Sales Company, 114 Liberty Street, New York, is interested in equipment for a factory to manufacture ball bearings and wishes to receive catalogs and general information concerning the subject.

John A. E. Jennings, who can be addressed care of Dexter & Carpenter, Inc., 12 Broadway, New York, is desirous of receiving on behalf of an English company, complete specifications of the following machines: Two turret lathes, two capstan lathes, two plain screw cutting lathes, one universal milling machine, one universal tool grinding machine, one radial drilling machine, one small high-speed drilling machine and one wet tool grinder with a 12-in. wheel.

A \$60,000,000 contract for cartridges, small arms and a new type of machine gun was closed in New York last Saturday between agents of the Russian Government and members of the Bradley Construction Company, New York, widely known as tunnel builders. It is reported that the Bradley interests have taken over the Savage Arms Company plant, Utica, N. Y., although a number of sub-contractors will be depended on for parts of automatic revolvers, etc. The machine gun is said to be a one-man contrivance of new design.

It is reported that a contract has been closed between the French Government and the New Haven Equipment Company by the terms of which the company, a new organization, will supply \$60,000,000 worth of rifles and ammunition. Deliveries are to run into 1917. Department heads of the Remington Arms & Ammunition Company of Bridgeport are said to be behind the new company.

Through J. P. Morgan & Co., the Canadian Car & Foundry Company has received an order for 5,000,000 shells. Like the first big order the Canadian company received, the shells are for Russia.

The large plant of the Singer Mfg. Company, Elizabeth, N. J., has gone on full time for the first time in many months. Some departments have been on full time occasionally, but now the entire factory is busy. The strike troubles in northern New Jersey have practically disappeared, and in several shops night-shifts are now working.

Foreign shipment, aside from government and munition equipment, is kept down by the limited cargo space available. Rates to Archangel have trebled within a week, they having been advanced from \$25 per gross ton to \$60 to \$85 a ton. Regulations in force at Russia's available seaports, Vladivostok and Archangel, are such that machinery cannot be carried into the interior or across Siberia unless the authorities have proof that it is to be used by the Government itself or for completing contracts for it.

The John R. Cooke & Son Company, Athenia, N. J., has been incorporated with a capital stock of \$50,000 by John R. Cooke, Alonzo Winters and Watts T. Cooke. It will take over the structural steel fabricating business which has been carried on by the company of the same name for the last ten years. The company has just completed a plant at Athenia to which it will move from its present location at Passaic, N. J., in order to take care of increasing business.

The structural steel fabricating plant of the Smith & Caffrey Company, Syracuse, N. Y., was destroyed by fire recently with a loss of about \$60,000.

The Ferguson Steel & Iron Company, Buffalo, is planning to erect an extension to its plant which will provide 35,000 sq. ft. additional fabricating space. It also contemplates a further addition giving it increased warehousing space of 15,000 to 20,000 sq. ft.

Plans have been filed by the Robins Dry Dock & Repair Company, 15 Whitehall Street, New York City, for a one-story brick shop, 103 x 164 ft., to cost about \$35,000.

The Turner Construction Company, 11 Broadway, New York City, has been awarded contract by the Hyatt Roller Bearing Company, Harrison, N. J., for the construction of an eight-story reinforced concrete factory, 75 x 200 ft., to be erected at Middlesex and Fifth streets and Railroad Avenue. Work will be undertaken at once.

The H. H. Shults Company has been incorporated with a capital stock of \$100,000 by Daniel B. Forbush, George Hines and Harry H. Shults, and takes over the business under the same name at Gowanda, N. Y., and will specialize in the manufacture of steel equipment and metal furniture, principally on contract.

The Hammond Steel & Forging Company, Syracuse, N. Y., is installing three large hammers and other steel-working equipment in its plant at Solvay, N. Y., which it is enlarging. W. H. Scott is secretary.

The Coles Picture Machine Corporation, 120 West Forty-first Street, New York, has been incorporated with a capital stock of \$50,000 to manufacture a motion picture projector. It will acquire an existing plant for its manufacturing operations. Howard B. Coles is president and William H. Coles, formerly associated with the McIntosh Hardware Corporation, Cleveland, Ohio, is secretary.

The Acme Road Machinery Company, Frankfort, N. Y., has increased its capital stock from \$50,000 to \$70,000; but does not anticipate any expansion beyond the steady growth of its business.

The Newburgh Ship Building & Mfg. Company, Newburgh, N. Y., has been incorporated by Benjamin B. Odell, Jr., Frank N. Bain, A. Lincoln and J. Miller of that city. The capital stock is \$150,000.

Favorable action has been taken on the request of the City Council, Rochester, N. Y., for the issue of \$100,000 of bonds for waterworks extension.

The Larrabee-Deyo Motor Truck Company, Binghamton, N. Y., has filed articles of incorporation to manufacture motor trucks, automobiles and accessories. The capital stock is \$80,000. H. C. Larrabee, A. C. Crossley and H. J. Parsons, Binghamton, are the incorporators.

Plans are in preparation by Robert O. Hoyt, engineer in charge, Corning, N. Y., for the construction of a reservoir and hydroelectric plant on Lake Keuka to furnish electric power and light to Corning, Savona, Campbell, Bath and other places. The waters of Wayne and Lamoka lakes will be utilized.

The Nosoot Company of America, Binghamton, N. Y., has been granted articles of incorporation to manufacture a patented compound and other chemicals. The capital stock is \$50,000. J. R. Smith, 686 Academy Street; A. D. and R. K. Klages, 47 Riverside Drive, New York City, are the incorporators.

## Baltimore

BALTIMORE, Md., Oct. 18, 1915.

The Poole Engineering & Machine Company, Baltimore, Md., is stated to have sufficient orders to keep the plant working double time for a year, and contemplates running three shifts. Its contracts for guns and other munitions of war call for the delivery of the articles whether the war continues or not. In addition to large orders for munitions of war now being filled, the company's domestic business is increasing at a gratifying rate. It has recently completed the installation of additional machinery and is now enlarging its plant by the erection of another building, 150 x 300 ft.

The Detrick & Harvey Machine Company, Baltimore, recently taken over by the Bethlehem Steel Company, has had its charter amended making as the object of the company the manufacture of iron, steel and other metals, and all articles of commerce whether of metal or otherwise, and to carry on the business of mechanical and electrical engineering, toolmaking etc.

A portion of the Industrial Building, Preston Street and Brentwood Avenue, Baltimore, has been leased by the Bartlett-Hayward Company, Baltimore. No announcement as to plans has been made.

The Harris Engine Works Company, Twelfth and Union streets, Wilmington, Del., is reported to be having plans drawn for a one and two-story hollow tile and steel factory, 75 x 150 ft. W. E. Hance, 204 West Twenty-fourth Street, Wilmington, is the architect.

A public garage and a tin shop will be established at 1104 West Thirty-sixth Street, Baltimore, by Daniel Shipley, 1021 West Thirty-sixth Street.

H. Kent McCay, harbor engineer, Baltimore, has been authorized to prepare specifications for a hydroelectric plant for the city.

Alterations are being made at the plant formerly occupied by the American Perfect Tile Shops, Eleventh and Union streets, Wilmington, Del., and as soon as they are completed the property will be occupied by the Harris Engine Company. Front and Orange streets. Traveling cranes will be installed. W. E. Hance, architect, Wilmington, is preparing plans.

An automobile repair station will be opened at Third and French streets, Wilmington, Del., by Oliver P. Haggerty, Sr. and J. S. Haggerty. Machinery is being installed.

Foundation is being laid for another press house at the Bethlehem plant at New Castle, Del. Four more boilers also will be installed. The plant will employ more than 1000 men.

With capital stock of \$20,000 the Gas Engine & Boat Corporation, Norfolk, Va., has been incorporated. J. H. Curtis is secretary.

Plans for a steel plant on Belle Isle, Va., are being made by the Old Dominion Iron & Steel Works, Richmond, Va. T. S. Wheelwright is general manager.

Williamsburg, Va., will issue \$30,000 of bonds for a water system. Address the mayor.

The Yost-Huff Company, Roanoke, Va., will be in the market shortly for machinery for an automobile repair shop.

## Philadelphia

PHILADELPHIA, Pa., Oct. 18, 1915.

Contract has been awarded to the J. Sims Wilson Company, 1125 Brown Street, Philadelphia, for the construction of a brick factory and a powerhouse, 20 x 50 ft., both one-story, for E. P. Woll & Co., Tacony and Church streets, Philadelphia.

William C. Markley, Pottstown, Pa., is taking bids for the construction of a two-story brick ice cream factory, 60 x 100 ft. Lachman & Murphy, Witherspoon Building, Philadelphia, are the architects.

The Coopers Creek Chemical Company, West Conshohocken, Pa., has awarded contract to the Pomeroy Construction Company, 1609 Ranstead Street, Philadelphia, for the construction of a two-story brick chemical plant, 30 x 47 ft.

The Home for Feeble Minded Women, care of Dr. Madeline Hallowell, Vineland, N. J., will receive bids Oct. 22 for the construction of a one-story brick powerhouse, 56 x 64 ft., to cost about \$30,000.

The Barrett Mfg. Company, Frankford, Philadelphia, has awarded contract to A. L. Carhart, Hale Building, Philadelphia, for the construction of a boilerhouse at Margaret and Bermuda streets, to cost about \$5,000.

Estimates are being made for the construction of a one-story brick addition to the factory of the Clement Restein

company, 133 North Second Street, Philadelphia, manufacturer of belting, packing, etc. It will be 60 x 225 ft. Carl P. Berger, 1418 South Penn Square, Philadelphia, is the architect.

Charles F. Sine, Commonwealth Building, Philadelphia, has awarded contract to George Steinbock, 1609 West Park Avenue, Philadelphia, for the construction of a one-story brick garage to be erected at Forty-first and Locust streets, at an estimated cost of \$35,000. It will be 100 x 175 ft.

The Franklin Foundry Company, Franklin, Pa., with a capital stock of \$25,000 has been incorporated by John H. Morrison, Seneca; Cora A. Kahle, Oil City, and Ulysses C. Kennedy, Oil City, to manufacture iron, steel, semi-steel and brass castings.

S. Wohlfeld & Bros., Inc., Philadelphia, has been organized with a capital stock of \$10,000 by James H. Wohlfeld, 3235 Page Street, Philadelphia, and others, to manufacture automobile trunks and other products.

A permit has been issued to A. H. Hipple, contractor, Harrisburg, Pa., to erect a fireproof garage and automobile repair plant, 105 x 148 ft., at 70-80 South Cameron Street, Harrisburg, for the A. H. Shaffer Wagon Works Company, at a cost of \$10,000.

The Aetna Explosives Company has purchased ground at Mount Union, Pa., and will shortly enlarge its plant there.

Plans have been approved for a factory to be built at Telescope, Pa., by the Telescope Cot Bed Company.

The Johnstown Water Co., Johnstown, Pa., has filed notice of a bond issue of \$75,000 to provide for additions to its plant.

The Lake Erie, Franklin & Clarion Railroad Company plans to issue \$8,000 in bonds for the purchase of shop machinery and equipment. Charles Miller, Franklin, Pa., is general manager.

E. T. Houghton & Co., manufacturers of oils, American and Somerset streets, Philadelphia, have awarded contract to Bushnell Brothers, 2146 East Norris Street, for the construction of a third story to its factory, 45 x 130 ft., at a cost of about \$12,000.

## New England

BOSTON, MASS., Oct. 18, 1915.

With the settlement of labor troubles in many places, manufacturers are able again to resume the plans for the necessary extensions to take care of the great volume of business. Domestic orders are showing steady and substantial increases as other lines of industry are reaching normal production. The construction of new plants and large additions is as marked a feature of most New England industries now as it has been in the recent months of the metal industries which were helped by the great volume of war orders.

The sale is reported of the great plant, costing \$2,000,000, built in 1909 at Portsmouth, N. H., for the manufacture of paper, by the Equitable Trust Company of New York to the R. B. Phillips Mfg. Company, which has factories in Worcester and Lowell, Mass. The property just sold is situated on the Piscataqua River and comprises about 110 acres of land. It has excellent facilities for shipments over the Boston & Maine Railroad. There are three manufacturing buildings, all of heavy mill construction on concrete foundations. The largest is 90 x 542 ft., three stories; another is 99 x 380 ft., two stories, and the third is 132 x 210 ft., two stories. There are also a two-story office building and several large storage buildings. The report states that the company has received a contract from the French Government for over \$20,000,000 worth of steel shell cases, through J. P. Morgan & Co.

A contract has been signed for the building of a large drydock at Boston, Mass., to be constructed under the supervision of the Board of Port Directors, and to cost \$3,000,000.

The Vacuum Fumigating Company, Boston, Mass., has been organized with a capital of \$400,000 to erect a plant for the fumigation of foreign cotton. The company will adopt the method of fumigation specified by the Department of Agriculture after exhaustive experiments.

The Bristol Brass Company, Bristol, Conn., is organizing a night shift and clearing the ground for large additions to its plant, plans for which have just been completed. The plans provide for a rolling mill, 188 x 300 ft., with a steel truss, saw-tooth roof, and a casting room, 60 x 300 ft., with monitor roof. Work is being rushed upon the rearrangement of spur tracks to afford better shipping facilities.

The Eastern Brass & Ingot Company, Bridgeport, Conn., has filed a certificate of incorporation with authorized capital of \$200,000. The incorporators are John H. Stearns, Ernest Munster and Albert Ziesk, all of Chicago, Ill.

The Warner Brothers Company, Bridgeport, Conn., has leased for three years the plant of the Nichols Underwear Company, New Milford, Conn. The leased plant will be used as a branch of the metal-working department of the Bridgeport factory.

The General Ordnance Company, a recently organized Delaware corporation with capital of \$500,000, has bought the plant of the United States Rapid Fire Gun Company, Derby, Conn., which has been in the hands of a receiver for several years. It is understood that interests identified with the Submarine Boat Company control the General Ordnance Company.

George W. Prentiss & Co., wire manufacturer, Holyoke, Mass., has awarded a contract for a two-story addition to cost about \$5,000.

The National Folding Box & Paper Company, New Haven, Conn., has completed plans for a factory addition, 105 x 345 ft., one and two stories. A four-story addition is nearly completed.

Contracts will be awarded before Nov. 4 for the new plant of the Waterbury Tool Company, Waterbury, Conn. The plans provide for a brick and steel building with monitor roof and additional bays with saw-tooth roofs.

The Waterbury Casting Company, Waterbury, Conn., is building a one-story addition, 20 x 50 ft.

The plans for the addition to the plant of the Waterbury-Farrel Foundry & Machine Company, Waterbury, Conn., are for a brick and steel building, 75 x 150 ft., two stories, with saw-tooth roof. Two traveling cranes will be installed.

The Maxim Munitions Company, New Haven, Conn., recently organized, will engage in the manufacture of the Maxim automatic machine gun, the latest product of the inventive genius of Hiram Maxim. The new gun has been designed especially to meet the conditions existing in the present European war. Hudson Maxim, president of the company, is authority for the statement that an order received from Russia calls for the entire product of the factory for an indefinite period.

## Chicago

CHICAGO, ILL., Oct. 18, 1915.

For the first time in many weeks there are reports of slackening inquiry, but this seems to be the isolated rather than general experience. For the most part, the unprecedented demand continues and delivery promises impose increasing burdens. Labor disturbances are, if anything, in a less favorable status, but the disposition on the part of the machine-tool builders to make concessions to the men promises a settlement of some of the difficulties. The railroads, being loath to pay the prices now obtaining, are doing little in the market.

The Ingalls-Shepard Forging Company, Harvey, Ill., is completing an addition to its forge shop, 100 x 190 ft., and 40 x 52 ft., has been added to the boilerhouse. The new equipment includes a Whiting 10-ton electric crane, 80-ft. span, 200-ft. run, with two 42-in. Cutler-Hammer lifting magnets; a 50-kw. Crocker-Wheeler motor generator set; an Ingersoll-Rand air compressor; 1500-hp. Cochran feed-water heater and purifier; a 600-hp. battery, Erie City water-tube boilers with Green chain grate stokers and ash sucker; one 7-ton Chambersburg steam drop hammer; two 5½-ton and one 2½-ton Niles-Bement steam drop hammers; two board drop hammers; six Cleveland motor-driven trimming presses and eight pyrometer-controller furnaces for heat treating. The Ingalls-Shepard Forging Company specializes on the heavier class of drop forgings having a large equipment of heavy hammers and forging machines. They are operating double-turn, entirely on domestic business, no war munitions contracts having been taken.

The Booth Cold Storage Company, Chicago, Ill., has perfected plans for seven large public cold-storage plants, two to be located in Chicago, and one each at Duluth, Buffalo, Omaha, Cincinnati and Pittsburgh.

The Improved Metal Shoe Company, Chicago, has been incorporated with a capital of \$10,000 by Charles Rimer, Alex Blacklock, 4323 Hazel Avenue, and James J. Cullen.

The Chicago Steel Foundry Company, Chicago, has taken out a building permit for the erection of a one-story foundry, 100 x 100 ft., to cost \$20,000.

The National Safety Device & Mfg. Company, Chicago, has been incorporated with a capital stock of \$25,000 by Leonard L. Cowan, 10 South LaSalle Street, John E. Erickson and Joel C. Carlson.

The Chicago Ferrule & Nut Company, Chicago, has been organized by James A. Craig, Grover T. Cook, 225 South Homan Avenue, and M. A. Foley. The company has a capital of \$20,000.

The Stromberg Motor Company, East Twenty-fifth Street, Chicago, is securing estimates covering the erection of a six-story factory, 60 x 110 ft., to cost about \$100,000.

The Steel Fabricating Company, Chicago, has been organized by Charles H. Aldrich, 137 South LaSalle Street, Park Phipps and August Drout, with a capital of \$50,000.



The Stewart-Warner Speedometer Corporation, Chicago, has acquired additional property on which it will erect a six-story factory to cost \$250,000.

Fire destroyed the plant of the Peoria Electric Mfg. Company, East Peoria, Ill., entailing a loss of about \$10,000.

The Granite City Tablet Company, St. Cloud, Minn., has decided to double the capacity of its plant and will buy additional machinery.

The Minneapolis General Electric Company, Minneapolis, Minn., is building an addition to its steam power station, which is to cost, with equipment, \$600,000.

Fire destroyed the roundhouse and machine shops of the Chicago, Burlington & Quincy Railroad at Grey Bull, Wyo., with an estimated loss of \$50,000.

The Standard Oil Company has announced that it will make improvements to its refinery at Neodesha, Kan., to cost \$200,000 to \$300,000.

The National Woodenware Company, Hill City, Minn., has plans for the addition of new buildings to its plant.

## Cleveland

CLEVELAND, OHIO, Oct. 18, 1915.

The demand for machine tools continues active, local machinery houses reporting business in small lots from widely scattered sources. The question of deliveries, previously unsatisfactory, has become more difficult as a result of the strike in the machine-tool plants throughout the country. Heretofore dealers have been able to rely on regular stock order shipments. While in many cases these orders have not been placed in large enough volume to supply the demand, dealers could depend on these shipments and could make deliveries accordingly. The situation is causing some decrease in the volume of orders. The demand for lathes for machining shells is still heavy and makers of single-purpose machines are booking many orders. In the general machinery lines the domestic demand for cranes in general is good, and the call for electric traveling cranes is active.

The W. M. Pattison Supply Company, Cleveland, Ohio, dealer in machinery and mill supplies, has started the erection of a warehouse and office building on Rockwell Avenue. The building will be a steel and concrete structure, 128 x 165 ft., five stories and basement.

To enlarge its manufacturing facilities, the Perfection Spring Company, Cleveland, will increase its authorized capital stock from \$1,500,000 to \$2,500,000. Only a portion of this, however, will be issued at the present time. It is announced that new interests will enter the company and these will be represented on the board of directors by F. F. Prentiss, Chester C. Bolton and T. E. Borton, Cleveland.

The Sharp Plug Company, Cleveland, will remove to Wellington, Ohio, where it will erect a building, 40 x 80 ft., for the manufacture of automobile spark plugs.

The Van Dorn & Dutton Company, Cleveland, which will shortly begin the erection of a new plant, has increased its capital stock from \$350,000 to \$450,000.

The addition to be erected by the Parish & Bingham Company, Cleveland, will be one story, 50 x 400 ft., and is to be used for an assembling and riveting room. It will be a temporary structure which will be replaced by a permanent one next spring.

The American Range & Foundry Company, Cleveland, will erect a foundry addition, 75 x 96 ft., and an additional 84-in. Whiting cupola will be installed. It will also purchase about 30 hand squeezers, the order for which has not been placed.

The Salier & Melvin Mfg. Company, Massillon, Ohio, has been incorporated with a capital stock of \$25,000 to manufacture gas heated flat-irons and lock washers. Gustav J. Salier and others are interested.

The Ohio Corrugating Company, Warren, Ohio, will double its capacity by the erection of an addition, 80 x 300 ft.

The Heltzel Steel Form & Iron Company, Warren, Ohio, is enlarging its plant in order to triple the capacity. It makes steel forms for concrete construction.

Dayton, Ohio, will receive bids until Oct. 28 for one 20,000,000-gal. steam-driven or turbine-driven centrifugal pump and triple expansion pumping engine. H. D. Wight is superintendent of waterworks.

The Willys-Overland Company, Toledo, Ohio, has placed a contract for the erection of a four-story and basement reinforced concrete factory, 388 x 400 ft.

The Consolidated Mfg. Company, Toledo, Ohio, is considering the removal of its plant to another city, with Lima, Ohio, and one or two other cities as possible sites.

The Allen Motor Car Company, Fostoria, Ohio, will erect an addition to its plant, practically doubling its present capacity.

The Cleveland Ford Tire Company, Ashland, Ohio, recently organized, has had plans prepared for an automobile tire plant and will shortly place contracts for a concrete and steel building.

The Harris Mfg. Company, Salem, Ohio, will shortly begin the erection of a new plant. It will be a two-story brick building, 40 x 150 ft.

The Marion Tire & Rubber Company, Marion, Ohio, recently incorporated, has elected W. W. Holvenstott, president; Charles W. Fairbanks, vice-president; Wilbur Jacoby, secretary, and D. H. Lincoln, treasurer. It will establish a tire-making plant.

The Houghton Sulkey Company, Marion, Ohio, announces that it will add motor trucks to its present line of manufacture.

## Detroit

DETROIT, MICH., Oct. 18, 1915.

The demand for both new and second-hand machine tools is excellent and the volume of business reported by local merchants is above the average. Stocks of certain lines of tools are pretty well depleted, but Detroit is in better position to furnish tools than some neighboring centers. The industrial situation continues good and there are few idle workmen of either the skilled or unskilled class. In common with some other midwest cities, Detroit is experiencing labor troubles, but the disturbances so far have been of a minor character and there seem to be no signs of any general unrest.

The Medallion Register Company, Detroit, has been incorporated with \$25,000 capital stock to manufacture mechanical numbering devices. The stockholders are Carl R. Pelton, Seth H. Heft and Leo M. Butzel.

George D. Mason, Detroit, has taken out a building permit covering the erection of a garage and repair shop to cost \$4,000.

The Welded Steel Barrel Corporation, Detroit, will construct an addition to its factory, 50 x 180 ft., one story, to cost \$5,000. Marcus R. Burrowes, architect, is receiving bids.

The Regent Mfg. Company, Detroit, manufacturer of toilet accessories, has increased its capital stock from \$10,000 to \$50,000.

The Briscoe Motor Company, Jackson, Mich., has completed tentative plans for a new plant to cost approximately \$100,000. Details of construction and equipment are not available.

The boiler shops, foundry and blacksmith shop of the MacKinnon Boiler Company, Bay City, Mich., were destroyed by fire Oct. 12, entailing a loss of about \$50,000. Plans for rebuilding have not been announced.

The Commonwealth Power Company, Jackson, Mich., will establish a substation at Fenton, Mich.

The Howell General Electric Motors Company, Howell, Mich., has been incorporated with \$30,000 capital stock to manufacture motors. A site has been acquired on which a factory will be erected at once. The incorporators include H. M. Spencer, Charles R. Norton and W. McP. Spencer.

The Eagle-Ottawa Leather Company, Grand Haven, Mich., will enlarge its factory by the addition of a finishing room, 63 x 135 ft., two stories.

The capital stock of the Hayes Wheel Company, Jackson, Mich., is to be increased from \$300,000 to \$1,000,000. The purpose of the increase is to enable the company to acquire additional plants at St. Johns, Mich., and Anderson, Ind.

The Dow Chemical Company, Midland, Mich., has increased its capital stock from \$1,500,000 to \$3,000,000.

The Metcalf Generator Company, Battle Creek, Mich., has been organized by O. K. Cummings and C. H. Scully to manufacture gas generators. A plant will be established at once.

The Columbia Motor Truck & Trailer Company, Kalamazoo, Mich., will remove its business to Pontiac, Mich. A factory will be built which will enable the company to increase its production.

The Brunswick-Balke Collender Company, Muskegon, Mich., will increase its facilities by the erection of a new factory, 90 x 120 ft., three stories. It will be equipped to manufacture billiard tables, bowling alleys, etc.

The Walter Clark Veneer Company, Grand Rapids, Mich., has awarded contract to the Warner-Kelly Company for the erection of a factory on Grandville Avenue, 113 x 165 ft., three stories, to cost about \$27,000.

The Blackmer Rotary Pump Company, Petoskey, Mich., will build an addition, 42 x 78 ft.

The Continental Motor Mfg. Company will build a drop forge plant at Muskegon, Mich.

The Auto Wheel Company, Lansing, Mich., has started work on a second addition, 54 x 160 ft., which, with its equipment, will cost about \$20,000.

The W. E. Dunn Mfg. Company, manufacturer of concrete machinery and oil engines, is being incorporated under the laws of the state of Michigan with a capital of \$40,000, and will move its machinery and equipment from Chicago to Holland, Mich.

The National Bronze & Aluminum Castings Company, Detroit, has been incorporated with \$10,000 capital stock to manufacture brass and aluminum castings. The incorporators include P. J. Donnelly, R. L. Pratt and A. J. Dettloff.

The H. F. Schivier Mfg. Company, Detroit, has been incorporated with \$10,000 capital stock by Henry F. Schivier, William J. Tyler and Floyd B. Meisenheimer. It will engage in the manufacture of metal products.

## Milwaukee

MILWAUKEE, WIS., Oct. 18, 1915.

Milwaukee manufacturers are profiting from the European war in many ways and foreign shipment, aside from war munitions, is increasing. The Bucyrus Company, South Milwaukee, has just shipped three large steam shovels to the reclamation service of the Russian Government, which formerly procured these implements from English builders. Machine-tool builders are obliged to decline orders because production for future delivery was long ago sold out. It is difficult to get bookings on lathes and milling machines. The past week has developed nothing of unusual importance in any line, but shops continue to work at full capacity and overtime. Reports from manufacturing centers in the interior of Wisconsin indicate a sound position, the demand for gas engines and agricultural machinery being at its best. The call for wood-working machinery is dull, but some manufacturers are putting out metal-working tools. Prime movers are inactive and not much is expected from this source before next year.

The Wehr Steel Company, Forty-fifth Avenue and Gordon Street, West Allis, Milwaukee, has broken ground for a foundry addition of brick and steel.

The Milwaukee Auto Engine & Supply Company, 708 Winnebago Street, Milwaukee, has awarded contracts for the erection of its new factory at Meinecke Avenue and Twenty-ninth Street. It will be of concrete, brick and steel, one and two stories and part basement, 60 x 120 ft.

A building is being reconstructed as a garage and machine shop for Fred M. Seaver, Waterloo, Wis.

The Muehlberg-Eastman Mfg. Company, Manitowoc, Wis., manufacturing patented hose couplers and couplings, has been reorganized and the sales and production divisions separated. Muehlberg & Sons will conduct the factory, and the M. E. Mfg. Company will devote its attention to selling the products. J. P. Eastman is head of the M. E. Mfg. Company.

The Burroughs Rowboat Motor Company, Racine, Wis., manufacturer of marine engines, is negotiating with the Chamber of Commerce, Merrill, Wis., with a view to relocating its works and headquarters. It established a plant in Racine about eighteen months ago and has decided to move to Merrill if local capital will take a \$15,000 interest.

It is reported from Ashland, Wis., that the Minneapolis, St. Paul & Sault Ste. Marie Railroad Company intends to reconstruct its ore docks at that point during the coming winter. The plans call for the erection of a steel and concrete ore dock in place of the present frame dock, and the installation of an electric power plant.

The Wallis Tractor Company, Cleveland, Ohio, controlled by capital affiliated with the J. I. Case Plow Company, Racine, Wis., is about to move its plant and headquarters to Racine. It has leased part of the former Racine-Sattley Company's carriage and wagon plant at Racine Junction and will equip it for the manufacture of gas engines and tractors at once.

Wright & Robbins, Portage, Wis., are establishing a garage and repair shop at 205-209 DeWitt Street.

The Auto Parts Mfg. Company, 528-532 Broadway, Milwaukee, has increased its capital stock from \$15,000 to \$15,000 to expand its business. James B. Millar is secretary and treasurer.

Ryall's Garage, Ladysmith, Wis., is adding a second story and will devote most of the additional space to repair shop.

The Flach-Schneeberg Company, Milwaukee, has been incorporated to manufacture automobile parts and accessories. The capital stock is \$5,000 and incorporators include Henry W. Flach, Fred Schneeberg and G. R. Ulbricht.

W. A. Hagen & Co., Manitowoc, Wis., are having plans prepared by Edwin A. Juul, architect, Sheboygan, Wis., for a public garage and machine shop, of fireproof construction, 50 x 115 ft.

Richard Cotter is remodeling the Littlejohn Building, Merrill, Wis., into a garage and machine shop.

John Nummerdoor and Herman Bobholz, Fox Lake, Wis., have purchased a site at Friesland and will erect a garage and repair shop.

The International Wire Works, Menasha, Wis., incorporated to manufacture wire screens for paper and pulp mills, has decided to build a plant at once instead of leasing quarters as at first planned. It has purchased the Menasha baseball park property, and ground has been broken for the first of the group of buildings. The site is bounded by three railroad lines, the Milwaukee, Soo and North-Western.

Work has been started on the erection of an addition to the plant of the Western Steel & Iron Works, Green Bay, Wis., which will cost about \$10,000.

The Wisconsin Bridge & Iron Company, Milwaukee, Wis., will erect a foundry building, 80 x 270 ft.

The Mattison Machine Works, manufacturer of special wood-working machinery, Beloit, Wis., has started to construct an addition to its erecting floor, 70 x 80 ft. No additional equipment is planned.

## Indianapolis

INDIANAPOLIS, IND., Oct. 18, 1915.

The Ames Shovel & Tool Company, Anderson, Ind., is making arrangements for increasing the capacity of its plant. It will probably build an addition, and plans are being made for installing motor drives for some of the machines.

The Keystone Pump Company, Indianapolis, recently organized, will remove the machinery and equipment of its plant at Toledo, Ohio, where it has been manufacturing pumps for eighteen months. The output of the plant at Indianapolis will be 100 pumps a month at the start. The sale of the pumps will be controlled by the Shotwell Company, Terminal Building, Indianapolis.

The Peter Anderson Company, Lafayette, Ind., has been incorporated with \$15,000 capital stock to build and repair vehicles. The directors are Peter, Anton and Clinton Anderson.

The Hoosier Auto Parts Company, Muncie, Ind., has been incorporated with \$100,000 capital stock to manufacture automobiles, etc. The directors are Karl A. Oesterle, George A. Ball and Frederick J. Lesh.

The Walter Concrete Machinery Company, Indianapolis, has been incorporated by C. M. Cooper, P. J. Hawkins and J. H. Woolling, with \$50,000 capital stock to manufacture concrete-working machinery.

The Indianapolis Structural Iron Works, Indianapolis, have been incorporated with \$50,000 capital stock by Charles T. Blizzard, Charles E. Owen and O. C. Waterman.

The Chamber of Commerce, East Chicago, Ind., announces the location of two new industries for that city, the Fort Dodge Culvert Company of Iowa and the Consolidated Fireworks Company of Pennsylvania.

The Hercules Gas Engine Works, Evansville, Ind., is now working day and night shifts, employing 600 men.

The Chard Lathe Company has shipped a carload of lathes to the Seldon Engine Company, London, England.

The American Sewer Pipe Company, Brazil, Ind., has just completed an addition to its plant of three stories 40 x 86 ft. It has a contract for 12-ft. sewers for Indianapolis which will keep the plant in operation for several months.

The Bimel Spoke & Auto Wheel Company, Portland, Ind., has abandoned the making of spokes and will give all its attention henceforth to the wheel department.

At the annual meeting of the Sefton Mfg. Company, Anderson, Ind., makers of refrigerators, the officers were re-elected. It was decided to make an addition to its plant at Chicago to cost \$125,000. Its other plants are at Brooklyn, N. Y., and Anderson, Ind.

The Peter Anderson Company, Lafayette, Ind., has been incorporated with \$15,000 capital stock to build and repair vehicles. The directors are Peter, Anton and Clinton Anderson.

A company has been organized at Kokomo, Ind., by Ira J. Hollensbe, Greensburg, Ind., and A. G. Seiberling, manager of the Haynes Automobile Company, to manufacture broom-making machines.

The A. J. Thompson Stone Company, Ellettsville, Ind., has increased its capital stock from \$20,000 to \$200,000.

## Cincinnati

CINCINNATI, OHIO, Oct. 18, 1915.

The local labor situation shows considerable improvement, and in the opinion of well-informed employers the present strike now affecting twenty-six manufacturing firms will soon end. One company reports nearly a half force at work, with daily additions that indicate it will be operating in full within a few days. The lack of public sympathy with the striking workmen has been an influential factor in the situation. Up to the present no case of violence has been reported in Cincinnati against the mechanics who continued at work. At Hamilton, Ohio, one large machine shop and four foundries have temporarily ceased operations. It is believed that the action of the courts there in imposing heavy fines on twenty-four strikers, found guilty of assaulting workmen at a local foundry, will bring closer the date of settlement of differences between employers and employees.

The foreign demand for machine tools still holds up. Radial drilling machines and shapers are being called for, although the larger sizes of lathes continue in the lead. Domestic business, except from makers of war munitions, continues slow. Makers of cotton oil mill machinery have just wound up a very unsatisfactory season, their business being confined mostly to repair parts and machinery for replacement. The boiler and tank business is improving.

The Cincinnati Screw Machine Company, Loveland, Ohio, recently incorporated, started up its plant this morning and will be operating in full by the end of the week. Nearly all necessary equipment has been purchased.

The Moore Oil Company, Cincinnati, will add four 150,000-gal. steel tanks to its plant at York Street and McLean Avenue.

The George H. Streitmann & Sons Company, Cincinnati, baker and cracker manufacturer, will add to its power plant equipment.

The Cincinnati Ball Crank Company, Cincinnati, has plans under way for doubling the size of its plant at Oakley. Building details are not yet available.

The Ahrens-Fox Fire Engine Company, Cincinnati, will make an addition to its plant that will be used mostly for storage purposes.

The Toledo Electric Welder Company, Cincinnati, has increased its capital stock from \$75,000 to \$150,000 and will enlarge its manufacturing facilities at a later date.

It is reported, but not yet confirmed, that Harry C. Ebert, Cincinnati, will head a company to build an automobile factory at Rochester, N. Y.

The Wright Aeroplane Company, Dayton, Ohio, has been bought by a syndicate of Eastern capitalists, and it is understood the plant will be enlarged at an early date. T. Frank Manville of the H. W. Johns-Manville Company, New York, has been elected president of the Wright Company.

The Dayton Metal Products Company, Dayton, Ohio, will make a further addition to its plant, estimated to cost \$4,000.

On Oct. 12 fire almost completely destroyed the plant of the Apple Auto Company, Dayton, Ohio, the loss being estimated at \$20,000. Rebuilding operations will begin at an early date.

The H. P. Maughlin Company, Columbus, Ohio, has been incorporated to manufacture builders' hardware and other specialties. H. P. Maughlin is one of the incorporators.

The Jeffrey Mfg. Company, Columbus, Ohio, has been compelled to put on a night force to take care of its increasing business. The company is not interested in the manufacture of war munitions of any kind.

## The Central South

LOUISVILLE, KY., Oct. 18, 1915.

Business in this section continues to show improvement, based not only on prospects here, but on the trade boom in the East. Buyers of machinery and other metal products are beginning to realize that deliveries are difficult to obtain, and orders which might have been held back otherwise are coming out. More large contracts are in the market, ready to be placed, than for a long time. This applies especially to steam power equipment. The demand for boilers is excellent, though complaints of low prices are still heard. Electric motors are in better demand. Special machinery, including wood-working equipment and machine tools, is good, while ice machines are selling well for this season.

The Louisville & Nashville Railroad Company, with general offices in Louisville, has plans for doubling the capacity of its shops at Howell, Ind.

Anderson Brothers, Corydon, Ind., are purchasing power

equipment and other machinery for a circular sawmill near Corydon.

The Phelps-Post-Guyn Company, Lexington, Ky., is in the market for road machinery, including a 20-hp. traction engine, 10-ton road roller, 200-ton rock crusher, with engine, and sprinkler.

The Dixie Auto Company, Russellville, Ky., has leased a building which will be equipped as a garage and automobile repair shop. A number of tools will be purchased.

Lexington, Ky., is considering the establishment of a garbage disposal plant.

The Lexington Utilities Company, Lexington, Ky., has taken over the plant of the Cynthiana Electric Light Company, Cynthiana, Ky., and will make improvements in the equipment.

The Bolinger Milling & Mfg. Company, Klondike, Tenn., will install a sawmill with a capacity of 5000 ft. a day. It is also in the market for transmission equipment and second-hand rails for a logging railway.

The John G. Duncan Company, 308 West Jackson Avenue, Knoxville, Tenn., will purchase a second-hand end matcher for a wood-working plant.

Gourley Brothers, Rogersville, Tenn., are in the market for a second-hand 6-hp. engine and boiler.

The L. D. Gastiher Company, Afton, Tenn., is reported to have plans for the establishment of a water-power plant at a cost of \$100,000.

The Tennessee Copper Company, 2 Rector Street, New York, will arrange for a \$3,000,000 bond issue to finance large improvements in its plant at Ducktown, Tenn. The capacity of the plant in regard to the production of sulphuric acid and other chemicals is to be greatly increased, it is stated.

The Economy Heating & Lighting Company, 807 Church Street, Nashville, Tenn., is in the market for materials for manufacturing a sheet metal specialty. L. R. Jarrett is manager.

G. H. Evans, Chattanooga, Tenn., has purchased the plant of the King-Baxter Lumber Company and will organize a company with \$100,000 capital stock to equip it as a planing-mill, box and flooring factory.

The Boone Fork Lumber Company, Elizabethton, Tenn., is in the market for a bandmill with a capacity of 40,000 ft. of lumber a day. A second-hand mill is wanted.

Plans for increasing the car repair facilities of the Illinois Central Railroad at Nonconnah, Tenn., near Memphis, include improvements in the power plant, including one return-tubular boiler, one Burke smokeless furnace, four superheaters and four soot blowers, besides a 42-in. motor-driven truck wheel lathe and a 50-ton forcing press in machine shop, etc.

The Nashville, Chattanooga & St. Louis Railroad, with general offices in Nashville, Tenn., will establish an additional car repair shop in Nashville.

The H. M. Wade Mfg. Company, Charlotte, N. C., is in the market for a second-hand or rebuilt 9-in. outside moulder.

The Continental Gin Company, Birmingham, Ala., has plans for an addition to its factory to cost \$10,000.

## Birmingham

BIRMINGHAM, ALA., Oct. 18, 1915.

Machinery dealers report a continuance of demand without special features, except perhaps a stronger call from the lumber mills, and their orders are for all manner of appliances connected with the trade. Electrical apparatus is also active, owing to the installation of electricity in coal mines, graphite mines and other works. The country merchant demand is very active.

W. T. McRimmon, J. H. Shepperd, and others will establish a bottling plant at Tuscaloosa, Ala., at a cost of \$15,000.

The American Bolt Company, Birmingham, has increased its capital stock from \$150,000 to \$200,000.

The Andalusia Packing Company, Andalusia, Ala., has let contract to R. V. La Barre, Birmingham, to build a \$70,000 packing plant. The total investment will be \$125,000.

The Farmers' Co-operative Warehouse & Ginners' Company, Troy, Ala., will establish a feed and grist mill.

William H. Strain and associates will establish a handle factory at Darien, Ga.

H. E. Kelley and C. L. Wilkerson, under title of the Georgia Mfg. Company, with a capitalization of \$25,000 and privilege to increase to \$100,000, will manufacture furniture at Rome, Ga.

The bed spring department of the Augusta Mattress Factory, Augusta, Ga., which was burned, will be re-established.



The city of Columbus, Ga., has engaged an engineer to look into the matter of establishing an electric power plant.

N. O. Ballard, Clarksdale, Miss., purposes the establishment of a cold storage plant and ice factory.

L. B. Vanderslice, Mulberry, Fla., will build a rice and grist mill at Plant City.

The city of Walhalla, S. C., will establish a municipal electric lighting plant.

The Wilson & Toomer Fertilizer Company, Jacksonville, Fla., is reported as planning to build a fertilizer factory to cost \$160,000.

## St. Louis

St. Louis, Mo., Oct. 18, 1915.

Demand for machine tools is broader and reports are more numerous of plans to develop new industries and extend existing ones. The difficulty of getting deliveries of needed equipment continues, with the result that second-hand machinery has been taken rapidly by purchasers who would prefer new tools, but are willing to take what they can get. The aggregate of purchases seems to be about up to the capacity of the market to supply. General business conditions all through the South and Southwest continue to improve. Money is easy, despite the crop movements and collections are reported even better than normal.

The Carpenter Ice Cream Company, St. Louis, Mo., has been incorporated with a capital of \$100,000 by J. Willard Carpenter, S. R. Ward, William J. Thompson, and others, to operate an ice-cream and dairy plant.

The St. Louis Plate Glass Company, St. Louis, Mo., with offices at Valley Park, Mo., will re-equip its plant, damaged \$150,000 by recent floods, and will resume operations.

The Peerless Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$25,000 by Henry C. Collins, Emil J. Beimdick and Frederick D. Collins, Maplewood, Mo., to manufacture patented devices.

The McQuay-Norris Mfg. Company, St. Louis, Mo., will erect and equip a larger plant than it now has for the manufacture of gas-engine piston rings. About \$50,000 will be expended.

The Wiggins Ferry Company, St. Louis, Mo., has plans for the equipment of a mechanically-operated coal terminal and dock system.

The plant of the Carthage Superior Marble Company, Carthage, Mo., has been sold to the John Gill Construction Company, Cleveland, Ohio, which will increase its capacity and remodel it.

The Quaker Mineral Paint Company, Kansas City, Mo., has been incorporated with a capital stock of \$30,000 by H. M. Green, J. B. Reeder and W. R. Green to manufacture surfacing paints.

Kirkwood, Mo., has plans for a municipal ice plant. James Bennett is chairman.

The Berry-Wood Player-Piano Company, Kansas City, Mo., has purchased a site on which to erect a plant for the manufacture of pipe organs, etc.

The Ozark Power & Water Company, Powersite, Mo., will increase its equipment, expending about \$25,000.

The Earle Light, Water & Ice Company, Earle, Ark., has purchased the Crittenden Power Company's plant at Earle and will increase its equipment.

The Arkansas Light & Power Company, Arkadelphia, Ark., will install two engines and a turbine pump in its plant at Newport, Ark.

The Pan-American Refining Company, Tulsa, Okla., has purchased a site and will equip an oil refining plant of undetermined but large capacity. This is the seventh such plant at Tulsa.

A pipe line and pumping plant will be equipped in Stephens County, Okla., by the Corsicana Petroleum Company, Corsicana, Tex.

Muskogee, Okla., under a recent bond issue of \$350,000 will require gas-pumping equipment of about 100,000,000 ft. of daily capacity for a natural gas system for manufacturing plants.

The Western Oil Station, Sapulpa, Okla., is reported in the market for pumping equipment.

The Dixie Culvert & Metal Company, Shawnee, Okla., is reported in the market for equipment for the manufacture of automobile license tags and similar metal products.

The plant of the Cummings-Moberly Cypress Company, Moberly, La., has been burned with a loss of \$50,000.

The Big Pine Lumber Company, Colfax, La., will re-equip its electric plant and boilerhouse recently burned.

## Texas

AUSTIN, TEX., Oct. 16, 1915.

In Texas and the Southwest the machinery and tool trade is very satisfactory. Business and industrial conditions in the large scope of territory in Mexico that is under control of Carranza show a marked improvement, according to reports received here. Orders for machinery have already been placed in the United States by mine owners and manufacturers of that country.

C. H. Bencini, Lubbock, will build a cotton-seed oil mill of four-press capacity.

The City Council, Decatur, will repair and enlarge the municipal waterworks plant at a cost of about \$10,000.

Karl M. Mitchell, city manager, Sherman, has appointed Charles Sayville, Dallas, to design a sanitary disposal plant. It is also planned to enlarge the municipal electric light plant.

The Dixie Oil & Refining Company, San Antonio, has prepared plans for enlarging its oil refinery. More machinery will be installed and tanks will be built.

The garage and machine shop of J. W. Ratcliff, Lewisville, recently destroyed by fire, will be rebuilt.

## The Pacific Northwest

SEATTLE, WASH., Oct. 12, 1915.

There is little new in machine tools, stocks of which are about exhausted except in a few of the cheaper lines, and the latter are receiving a good deal of interest from the garage and small shop trade. The general machinery trade is improving. Alaskan developments are coming to take the lead in importance, with important inquiries connected with the Government and other railroads, and frequent large shipments to the mines. Some important business, also, continues to come from mining and smelting interests nearer at hand. The lumber situation is still discouraging, but it is believed the bottom has been reached, and prices in some lines are a little firmer. General export trade is as large as can be accommodated by the vessels available, and ship-building plants are well occupied. Implements, gas engines, etc., for country use continue in strong demand, and the small shops around the country are quite generally busy. A good many inquiries are appearing in connection with public improvements.

The capital stock of the Pacific Boiler Company, Seattle, has been increased to \$100,000. It is understood the new funds will be used in making extensions and improvements to the plant.

West Coast Packing Company, Blaine, Wash., has filed articles increasing its capital stock from \$30,000 to \$50,000. The company plans to install some new machinery.

Seward, Alaska, has granted to the Seward Electric Light & Power Company a franchise for a light and power plant in that city. It is understood the company will begin construction work at once.

The Wickersham Mill Company, Bellingham, Wash., has been incorporated by H. C. Knowles and Fred W. Llewellyn for \$50,000. It plans the construction of a lumber mill.

The Alaska Engineering Commission, Bell Street Dock, Seattle, will construct a waterworks system at Anchorage, Alaska. The work calls for a steam pumping plant of 500 gal. per min. capacity on Ship Creek. C. E. Dole is purchasing agent.

The Kellogg Water Power Company, Kellogg, Idaho, has purchased the local water system owned by John Verboggi and will make improvements to it.

The Baker Mines Company, Baker, Ore., plans to build a pipe line to furnish water power for its plant at Cornucopia. Two water wheels will be installed.

The plant of the Terrel Incubator Company, Montesano, Wash., has been purchased by Claude Nutter and A. J. Bradley of that city, who will remodel it and place it in operation.

The Radiator Stove Company, Bellingham, Wash., has been incorporated by J. J. Hardin, F. D. Yale and R. H. Krieser for \$50,000. It will utilize the Bellingham Iron & Steel foundry for its initial plant. As business increases the plant will be extended. Improvements are to be made at this time and stovemaking equipment installed.

The Pacific Furniture Specialties Mfg. Company, Portland, Ore., will erect an additional boilerhouse to cost about \$2,000.

The Cartmell-Hakle Pump Company, Seattle, Wash., has been incorporated by J. W. Kahle and C. A. Riddle for \$100,000.

The Poulsbo Light & Power Company, Poulsbo, Wash., has been incorporated by J. C. Moe, Elmer Nilsen and A. S. Ryland, to construct a small power plant to supply that city.

## Canada

TORONTO, Oct. 18, 1915.

The shell and gun manufacturers of Canada are still active buyers of tools. Contracts which will be let shortly for larger shells will further increase the demand. The steel companies are continuing activity in the manufacture of railroad equipment and rails for foreign countries. Practically all the foundry trade is improving. The manufacturers are showing evidence of the decided activity in business by making large additions to their plants. The lumber trade shows considerable briskness, and large mills are being erected in both the eastern and western provinces. Buying of farm implements in western Canada has shown a decided improvement over other years. The cities and municipalities have been keeping up their end of the business activity by erecting and adding to waterworks, electric light and sewage disposal plants, etc.

The Brantford Cordage Company, Brantford, Ont., has commenced building operations on an addition, which will double the present capacity. The entire plant will be operated by electric power. The company will also erect a plant at Winnipeg.

The Glass Garden Builders, Ltd., 201 Church Street, Toronto, will build a factory at Georgetown, Ont., to manufacture greenhouses, etc.

The Port Moody Steel Works, Ltd., Port Moody, B. C., has been incorporated with a capital stock of \$150,000 to erect a plant to manufacture iron, steel, tools, etc. It is expected that construction work will be started in the near future.

The Canadian Oil Company, 12 Strachan Avenue, Toronto, is contemplating extensions to its plant at Petrolia, Ont. J. Tavenner is local manager.

The Ottawa Dairy Company, Ottawa, has let the contract for the erection of an ice-making plant to cost \$15,000.

E. Leonard & Sons, York Street, London, Ont., is contemplating the installation of electrical drive in its plant for operating lathes, planing machines, etc.

Bids will be called for shortly by Chatham, Ont., for a boiler to replace the present electric light plant boiler. W. G. Merritt is clerk.

A temporary heating plant, to cost about \$5,000, will be installed at the Mountain Hospital, Hamilton, Ont., by the City Council. Later a permanent plant will be constructed at a cost of \$30,000. Plans will be prepared at once.

The O'Brien Munitions, Ltd., Renfrew, Ont., has been incorporated with a capital stock of \$2,000,000 by M. J. O'Brien and others of Renfrew, Ont., to manufacture munitions, guns, shells, explosives, etc.

Bids will be received by T. L. Church, chairman board of control, Toronto, till Nov. 9 for the supply of a radial drill for machine shop, for the Danforth Avenue car barns. Specifications may be obtained from the works department, Room 12, City Hall.

The Roelofson Machine & Tool Company, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by Craig A. McKay, care of Bicknell Bain, Macdonell & Gordon, 6 Adelaide Street, East; James W. Bicknell, Harry Riley and others to manufacture machinery, tools, etc.

The Canadian McCall Incinerator Company, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$300,000 by Frank Denton, 20 King Street, East, Toronto; John I. Grower, Ewen J. MacEwen and others to manufacture incinerator plant equipment, etc.

The Universal Appliance Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of \$150,000 by John F. MacGregor, Thomas S. H. Giles, John S. Duggan, 25 Harbord Street, and others, all of Toronto, to manufacture automobiles, motors, engines, etc.

The Canadian Tygard Engine, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$3,000,000 by Charles H. C. Leggott, 102 Gould Street; William W. Perry, Scarborough Junction, and others, to manufacture gas engines, steam engines, etc.

The Galt Machine Screw Company, Ltd., Galt, Ont., is calling for bids for the erection of a factory. J. Evans, Scott & Bennett Block, is the architect.

The Thomas Davidson Mfg. Company, Ltd., Montreal, will erect a factory at 187 Delisle Street for the manufacture of sheet iron, enamelled ware, copper ware, wire goods, etc.

Lennoxville, Que., will spend \$40,000 on improvements to its waterworks plant. No contracts have been let. W. W. Baker is secretary.

Work will be started shortly on the construction of a sewage disposal plant, pumping station, etc., at Mimico, Ont., at a cost of about \$80,000. F. F. Fry, 699 Keele Street, Toronto, was awarded the contract for the disposal plant.

Port Coquitlam, B. C., will spend \$35,000 for the installation of a waterworks plant and system.

The Ontario Cartridge Company, Ltd., Ford, Ont., has been incorporated with a capital stock of \$40,000 by John H. French, Walter F. Tant, Forrest M. Keeton and others, all of Detroit, Mich., to manufacture ammunition, cartridges, shells, etc.

Edward Ramage, 265 Wellington Street, West, Toronto, is in the market for a 20-hp. to 30-hp. alternating current motor.

The Automatic Sales Machine Company, Ltd., Victoria, B. C., has been incorporated with a capital stock of \$10,000 to manufacture machinery, tools, etc.

The Elkhorn Lime Company, Madoc, Ont., will make additions to its plant for the manufacture of hydrate and bulk lime, etc., and will also build a barrel factory. C. W. Sharpe is president.

Beverly Township, Ont., will build an electric power plant to cost \$5,000.

The British Columbia Electric Railway Company, 413 Carrall Street, Vancouver, B. C., will make extensions to its cable plant.

The Imperial Oil Company, which has a plant at Burrard Inlet, B. C., is building an island headquarters plant at Victoria, B. C. Work is going ahead on a wharf, seven tanks, a boilerhouse, warehouse, etc.

L. H. Martin, Bury, Que., will build a sawmill to cost about \$10,000.

The Cape Breton Pulp Company, St. Ann's, B. C., whose plant was recently destroyed by fire, will rebuild immediately.

The Chevrolet Motor Car Company, recently incorporated with head office at Toronto, Ont., has purchased the plant of the Dominion Carriage Company, Perth and Kingsley avenues, Toronto, and is applying for a permit to erect a \$15,000 addition to it.

In an interview Sir Henry Pellatt stated the Steel & Radiation, Ltd., is actively engaged in filling its existing shell contract, which expires at the end of the present year, and has already received notification from Ottawa that the contract will be renewed at that time on the same basis as the one now existing.

The Vancouver Toy & Novelty Company, Vancouver, B. C., has been incorporated for \$25,000, and it is understood will construct a small manufacturing plant in that city.

## Government Purchases

WASHINGTON, D. C., Oct. 18, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Nov. 9, schedule 8913, for four blowers of 1000 cu. ft. per min. capacity; schedule 8917, ten portable electric drills and five electric bench grinding machines for Brooklyn; schedule 8906, two polishing and buffing lathes, and schedule 8912, one power gap shear and one rotary shear with circular cutting extension, all for Norfolk; schedule 8903, one universal grinding machine and two wire feed screw machines for Washington.

Bids will be received by the lighthouse inspector, Tompkinsville, N. Y., until 2 p. m., Oct. 25, for furnishing one four-drum, double-cylinder hoisting engine, and until Oct. 27 for furnishing one feed pump, one fire and bilge pump, one sanitary pump, one fresh water pump, two main circulating pumps, two feed water heaters, injectors, etc.

The Commanding Officer, San Antonio Arsenal, San Antonio, Tex., will receive sealed proposals until Oct. 25 for furnishing one No. 3 universal tool grinder of the Osterheim type or equal.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, on Oct. 12 for supplies in the Navy Yards, as follows:

Schedule 8767, Steam Engineering. Bids submitted by the Niles-Bement-Pond Company

Class 15, one foundry crane for shipment by the government to Olongapo, delivery as follows:

Bid A—F. a. s. steamer, San Francisco—\$4,995.

Bid B—F. a. s. steamer, New York—\$4,665.

Bid C—F. o. b. works—\$4,630.

Class 16, one electrical traveling crane for shipment by the Government to Olongapo, deliveries as follows:

Bid A—F. a. s. steamer, San Francisco—\$6,720.

Bid B—F. a. s. steamer, New York—\$6,160.

Bid C—F. o. b. works—\$6,095.

Schedule 8110, Steam Engineering

Class 81, Boston—Complete installation of sand blast system—Mott Sand Blast Mfg. Company, \$4,350, informal; Pangborn Corporation, \$5,633.92; W. W. Sly Mfg. Company, \$5,200, informal; J. W. Paxson Company, \$5,250.

by

16-00